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1

THE GIFT OF
EORGE LIVERMORE,
Of Dana Hill,
CAMBRIDGE,
1 May, 1863.

Alexandria D.C.

Penning

July 25. N

J. Shaw 1/4

Boston

P. Mackintosh Jr.

July 1825.

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EORGE LIVERMORE,
Of Dana Hill,
CAMBRIDGE,
1 May, 1863.

[illegible]

[illegible]

[illegible] 25. N

J. Shaw

Boston

L. Mackintosh Jr. July 1825.

A

KEY

TO THE

American Tutor's Assistant

REVISED;

IN WHICH ALL THE

EXAMPLES

NECESSARY FOR A LEARNER

ARE

WROUGHT AT LARGE;

AND ALSO

SOLUTIONS

GIVEN OF ALL THE

QUESTIONS FOR EXERCISE

IN THE VARIOUS

RULES.

Designed principally to facilitate the Labour of Teachers,
and assist such as have not the Opportunity
of a Tutor's Aid.

BY FREDERIC McKENNEY,
PRECEPTOR OF YOUTH.

PHILADELPHIA.

PRINTED FOR JOSEPH CRUKSHANK.

1817.

MBERED, That on the Tenth day of O
ourth Year of the Independence of the Un
merica, A. D. 1809, JOSEPH CRUKSHAN
trict, hath deposited in this Office, the
ne Right whereof he claims as Proprieto
llowing, to wit:

the American Tutor's Assistant revised
all the Examples necessary for a Learne
ght at large; and also Solutions given o
uestions for Exercise in the various Rule
gned principally to facilitate the Labou
hers, and assist such as have not the Op
of a Tutor's Aid. BY FREDERIC M'KEN
ptor of Youth."

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led, "An Act for the Encouragement of L
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ors and Proprietors of such Copies, durin
ein mentioned." And also to the Act, en
pplementary to an Act, entitled, "An A
gement of Learning, by securing the Co
ts and Books, to the Authors and Proprie
h during the Time therein mentioned," an

WE, whose names are underwritten, having examined a work, in manuscript, entitled, "A Key to the American Tutor's Assistant," do highly approve of the manner in which it is performed; and from a persuasion that it is well calculated to afford a friendly aid to Teachers, in their arduous employment, as well as to young gentlemen desirous of revising their Arithmetical Studies, and who have not the opportunity of a Teacher's aid.....Do cheerfully recommend it as a Book well worthy to be encouraged, and introduced into Seminaries of Learning.

JAMES M‘GINNESS, Harrisburg.
WILLIAM ALLISON, Middletown.
EDWARD M‘CREA, Little Chickies.
JOSEPH JEFFERS, at Donegal Meeting-house.
PAUL BOGGS, Lancaster.
JOHN GALLIGHER, Lancaster.
T. JONES, Elizabeth-town.
NEAL M‘CLOY.
JAMES DAVIS.

mpound Division, - 39
duction - - - 43
ngle Rule of Three - 49
verse Proportion, - 62
uble Rule of Three, - 67
actice, - - - 74
re and Trett, - 90
nple Interest - - 95
urance, Commission, &c. 102
mpound Interest, - 104
bate or Discount, - 106
uation, - - - 107
rter, - - - 108
ss and Gain, - 111
Double Rule o
The Square Ro
The Cube Roo
Arithmetical P
Geometrical Pr
Simple Interest
Alligation,
Single Position,
Double Positio
Permutation &
Addition of Du
Subtraction of
Multiplication o
Promiscuous Q

Explanation of Characters.

Signs.	*Significations.*
=	equal ; as 20*s.*=*L.*1
+	more ; as, $6+2=8$
—	less ; as, $8-2=6$
×	into, with, or multiplied by ; a
÷	by (i. e. divided by) as, 6÷
: : : :	proportionalty ; as 2 : 4 :: 6 :
or $\sqrt[2]{}$	Square Root ; as, $\sqrt[2]{64}=8$
$\sqrt[3]{}$	Cube Root ; as, $\sqrt[3]{64}=4$
$\sqrt[4]{}$	Fourth Root ; as, $\sqrt[4]{64}=2$, &c
———	a Vinculum ; denoting the

THE

KEY

TO THE

American Tutor's Assistant.

NUMERATION.

Answers to the Examples in this Rule.

Example		Example	
(1)	106	(6)	251600
(2)	538	(7)	8142006
(3)	6074	(8)	65104090
(4)	12510	(9)	502304000
(5)	45601	(10)	948632751

SIMPLE ADDITION.

EXAMPLES.

(1)	1261323	(2)	302808675
(3)	687214855	(4)	358433426
(5)	90988481		

Application.

(1)
5856
3840
395
265
25
3784
ans. 14165

(2)
1718
99
answer 1817

(3)

on bond	807
book accounts	1047
bills and notes	86
in cash	478
answer *L.*	2418

(4)

the bond	4687
interest	178
amount	4865 dols.

(5)

1st purse	5784
2d do.	588
3d do.	84
4th do.	779
answer	7235 dols.

Nuts given in all 997

Daughters

other lega

an

(8)

No.	yds.
1	367
2	367
3	407
4	407
5	407
6	228
7	228
8	228
9	300
10	300
answer	3239 yds.

(9) No.

a

(10)

4 bales	52 pieces	13
3 do.	40 do.	10
answer	92 pieces	24

(12) At one o'clock it strikes 1
2
3
4
5
6
7
8
9
10
11
12

Strikes in 12 hours 78 times
+ 78

ditto in 24 hours 156 times
156
156
156
156
156
156

answer 1092 times in a week.

(13) Less number 9876
Differ. twice { 9876
as many { 9876

The greater 29628

(14) Paid at sundry times { 89
196
226
327
yet to pay 162

Sum 1000 dols.

SIMPLE SUBTRACTION.

EXAMPLES.

(1) 375749613 (2) 599352989
(3) 81422543 (4) 679172963

Sold 286
gave away 60
lost 437 } +

Take 783

Remains 217

Feet.
(5) From 172

A 57
B 42

Take 99

answer 73 feet.

Second
Third
Fourth

From
Take

answer

lbs.
Bought of A { 175
175
of B { 183
183
183
of C { 196
196
196
196

From 1683
Take 158

Rem. 1525

(7) Due to A 478 *L.*
Interest thereon 98

From 576
First payment 199 } +
Second ditto 199 }

Take 398

Remains *L.* 178 unpaid

	Pipes	gals.
(8) Bought	20	2459
Sold	14	1682
answer	6 pipes	777 gal.

(9) The bond *L.* 4700

At different payments { 1478, 1319, 826, 628

4251

Remains unpaid 449 *L.*

MULTIPLICATION.

CASE 1.

(1) Mul. 4543627
by 2
Product 9027254

(2) 51473689
3
154421067

(3) 75134628
4
300538512

(4) 64132579
5
320662895

(5) 83174268
6
499045608

(6) 41379462
7
289656234

(7) 74136982
8
593095856

(8) 80736014
9
726624126

(9) 9761436
10
97614360

(10) 47140651
11
518547161

(11) 273406152
12
3280873824

(12) 96478362
12
1157740344

CASE 2.

(1) Mul. 5740632
by 4 × 8 = 32
22962528
8
183700224

(2) 3740016
8 × 7 = 56
29920128
7
209440896

(3) 7063115
8 × 12 = 96
56504920
12
678059040

(4) 7034652
12 × 12 = 144
84415824
12
1012989888

Examples agreeably to the Note.

(1) 6782158
14
94950212

(2) 6874281
15
103114215

(3) 2816054
16
45056864

(4) 5473682
17
93052594

(5) 4786824
18
86162832

(6) 6789863
19
129007397

CASE 3.

(1) 7643827
23
22931481
15287654
175808021

(2) 8142630
75
4071315
5699841
610697250

(3) 943617|0
92|0
1887234
8492553
8681276400

(4)
376041|0
484|0
1504164
3008328
1504164
18200384400

(5)
815036|000
703|00
2445108
5705252
57297030800000

(6)
190046|0
1615|00
950230
190046
1140276
190046
306924290000

(7)
380092|0
8075|0
1900460
2660644
3040736
306924290000

(8)
6247386495
27356
37484318970
31236932475
18742159485
43731705465
12494772990
170903504957220

(9)
12494772990
13678
9995818392
8746341093
7496863794
3748431897
1249477299
170903504957220

(10)
47001881
1140090
423016929
188007524
47001881
47001881
53586374509290

(11)
94003762
570045
470018810
376015048
658026334
470018810
53586374509290

1403561394
701780697
233926899

3200004886285692

Application.

(1) 2564
40

answer 102560 dols.

(2) 46
5 × 7 = 35

230
7

ans. 1610 = sq. feet.

(3) 9876
× 6789

88884
79008
69132
59256

67048164

(4

answer

B. ps.
(5) 7 × 11 = 77 ps.

B. P. ps.
(6) 4 × 9 = 36

		Yards.
(7) No. 1 & 2 each	367 × 2 =	734
3, 4 & 5	407 × 3	1221
6, 7 & 8	228 × 3	684
9 & 10	300 × 2	600
	answer	3239 yds.

(8) 13578
4938
108624
40734
122202
54312
Product 67048164 ans.

(9) 126
× 109
1134
126
13734 Trees
1007
96138
13734
13830138 Apples.

(10) 52 Counties
× 42
104
208
2184 Parishes
× 246
13104
8736
4368
537264 Houses.
× 10
5372640 Persons.

SIMPLE DIVISION.

SHORT DIVISION.

EXAMPLES.

(1) 2)7346286
Quot. 3673143

(2) 3)5112896
1704298–2 rem.

(3) 4)37612285
9403071–1

(4) 5)97036142
19407228–2

(5) 6)74830956
12471826

(6) 7)91430682
13061526

Examples agreeably to N

(1) 6)7463521
18= 3)1243920–1

Quotient 414640–1 rem.

(2)
48=

(3) 8)740043612
96= 12) 92505451–4

7708787–60 rem.

(4)
144=

LONG DIVISIO

EXAMPLES.

(2) 95)7461389(78540
665

811
760

513
475

388
380

(3)

(4) 250

```
     (5)
41659)756390289(18156
      41659
      ------
      339800
      333272
      ------
       65282
       41659
       ------
       236238
       208295
       ------
        279439
        249954
        ------
         29485
         ------
```

```
     (6)
87648)9871369542(112625
      87648
      ------
      110656
       87648
       ------
       230089
       175296
       ------
        547935
        525888
        ------
         220474
         175296
         ------
          451782
          438240
          ------
           13542
```

```
     (7)
175296)19742712000(112625
       175296
       ------
        221311
        175296
        ------
         460152
         350592
         ------
         1095600
         1051776
         -------
          438240
          350592
          ------
           876480
           876480
           ------
```

```
     (8)
476838)139736422224(293048
       953676
       -------
       4436882
       4291542
       -------
        1453402
        1430514
        -------
         2288822
         1907352
         -------
          3814704
          3814704
          -------
```

(9) 293048)139736422224(476838
1172192

2251722
2051336

2003862
1758288

2455742
2344384

1113582
879144

2344384
2344384

Examples agreeably to the Note.

(1)
8146|00)83176425|00(10210
8146

17164
16292

8722
8146

Remainder 576500

(2)
1692|00)166341320|00(10210
16292

34213
32584

16292
16292

0

(3) 12749|000)87521885|000(6865
76494

110278
101992

82868
76494

63745
63745

```
(4)   2746|0000)35008754|0000(12749
                2746
                ----
                 7548
                 5492
                 -----
                 20567
                 19222
                 -----
                  13455
                  10984
                  -----
                   24714
                   24714
                   -----
```

Application.

```
(1)   136)3264(24 miles.
          272
          ---
           544
           544
           ---
(2)    855  4275  5 Boys
            4275
            ----
(3)    186  5022  27 L. each.
            372
            ----
            1302
            1302
            ----
```

```
(4)  1763)8435955(4785 ans.
          7052

          13839
          12341
          -----
           14985
           14104
           -----
             8815
             4415
             ----
```

```
(5)   7969)1864746(234 answer.
           15938
           -----
            27094
            23907
            -----
             31876
             31876
             -----
```

```
(6)   14 = { 2)2072
           { 7)1036
             ------
   answer     148  Trees in a
              ---         row.
```

answer 342 Bales.

(9) 346)42904(124
346

830
692

1384
1384

answw

(10)
25={5)4500
5) 900

answer 18(

(11) 256)4(
2:

2(
2(

FEDERAL MON:

ADDITION.

	E.	D.	d.	c.	m.
(1)	211	9	7	2	5

(2)

	D.	c.
(3)	1110	00

(4)

Application.

	E.	D.	d.	c.	m.
(3)	250	0	0	0	0
		9	0	0	0
			8	0	0
				6	0
					5
Facit		2509	8	6	5

		D.	c.
(4) Due to	A	462	50
	B	365	19
	C	23	64
	D	86	92
	E	35	74
	F	84	33
owes in all		1058	32

		D.	c.
(5)	Horse cost	125	00
	Chair	120	00
	Harness	26	45
	Saddle	16	43
	Bridle	4	16
Whole amount		292	04

		D.	c.
(6)	In notes	1055	00
	Gold	260	00
	Silver	3650	00
	Cents	2	50
Amount		4967	50

SUBTRACTION.

EXAMPLES.

	D.	cts.
(1)	132	22

	D.	cts.
(2)	1731	99

	D.	cts.
(3)	772	11

	D.	d.	c.	m.
(4)	6	2	2	7

	D.	c.
(5)	344	33

	E.	D.	d.	c.	m.
(6)	53	2	2	0	7

	D.	cts.
(7)	2277	84

	D.	cts.
(8)	913	05

	D.	cts.
(9)	3929	05

Application.

	D.	cts.
(1)	43	75
—	24	33
answer	19	42

	D.	c.
(2)	4967	50
—	3765	14
answer	1202	36

	D.	cts.
(3)	1965	44
Drawn for at sundry times.	960	00
	560	33
	59	29
—	1579	62
Remains	385	82

Borrowed	500	44
Paid	204	56
Remains	295	88

(6)	D.	c.	m.
	4700	00	0
	98	15	0
	109	37	0
	7	01	2
	—214	53	2
ans.	448 5	4 6	8

(5)			
From an Eagle	10	00	
Paid for Beef	1	33	+
Veal	1	75	
Ducks	0	75	
Butter	1	50	
Vegetables	0	67	
Take	6	00	
Return	4	00	

	E.	D.	d.	c.	m.	
(7)	7	5	0	0	0	
		7	5	0	0	
				7	5	
		—7	5	7	5	
	6	7	4	2	5	facit

MULTIPLICATION.

EXAMPLES.

(2) Multiply 376
by ,06
Product 22,56

(3) 5345
,08
427,60

(4) 3976
,09
357,84

(6) 268
,24
1072
536
64,32

(7) 424
,36
2544
1272
152,64

(8) 576
,48
4608
2304
276,48

(10) D.c.
439,17
7
3074,19

(11)	D.	d.	c.	m
	9	0	4	5
			2	9
Product	262	3	0	5

(12)	D.	d.	c.	m.
	7	3	6	8
				30
	221	0	4	0

Application.

(1) 456
,08
answer 36,48

(2) 896
,23
2688
1792
answer 206,08

(3) 976
2,14
3904
976
1952
Dolls. 2088,64

D.c.
(4) 6,33
34
2532
1899
Dols. 215,22

Gals.
(5) 115
,43
345
460
Dols. 49,45

(6) 6,75
6×6=36
40,50
6
Facit 243,00

D.c.
(7) 3,43
296
2058
3087
686
Dols. 1015,28

(8) 256
1,23
768
512
256
answer 314,88

lb.
(9) 3950
,29
35550
7900
Dols. 1145,50

(10) 1945 Bar.
8,25
9725
3890
15560
Dols. 16046,25

(11) 458 Bar.
3,50
22900
1374
Dols. 1603,00

DIVISION.

EXAMPLES.

2)356,56
Quotient 178,28

3)338,45
$112,81\frac{2}{3}$

4)2896,44
724,11

Dols.cts.
5)6238,44
$1247,68\frac{4}{5}$

Dols.cts.
7)3862,19
551,74–1

Dols.cts.
9)2384,27
264,91–8

```
15={ 3)6238,44 by 15        25={ 5)2476,23 by 25
   { 5)2079,48                 { 5) 495,24–3 }
       415,89–9 remain.              99,04–4 } 23 rem.

33={ 3)3852,19 by 33             5)2384,27 by 45
   { 11)1284,06–1 }              9) 476,85–2 }
         116,73–3 } 10 rem.           52,98–3 } 17 rem.

     52)3278,94(63,05            56)2954,76)52,76
        312                         280
         158                         154
         156                         112
           294                        427
           260                        392
  Remainder 34                         356
                                       336
                                        20

   67)3758,39(56,09+             75)9645,75(128,61
      335                           75
       408                          214
       402                          150
         639                         645
         603                         600
          36                          457
                                      450
                                        75
                                        75

                  87)5798,94(66,65
                     522
                      578
                      522
                       569
                       522
                        474
                        435
                         39
```

Application.

(1) 4)24,32
Facit dols. 6,08

D.c.m. c. m.
(2) 112)1400,0(,12,5 answer.
112
280
224
560
560

D.c.
(3) 196)7,84),04
787

D.c. c.m.
(4) 125)8,50(,06,8 per shad.
750
1000
1000

c. m.
then ,06,8
×25
340
136
answer dols. 1,70,0

D. c. D.c.
(5) 34)215,22(6,33 answer.
204
112
102
102
102

D. c. D.c.
(6) 126)189,00(1,50 ans.
126
630
630

D.c.
(7) 115)49,45),43 cents answer.
460
345
345

COMPOUND ADDITION.

EXAMPLES.

(2) *L.* 23957 13 5 (3) *L.* 20000 (4) *L.* 1820 19 4½
(5) *L.* 1806 18 1¾ (6) *L.* 2377 1 8¾ (7) *L.* 43451 18 3
(8) *L.* 42638 14 3¼ (9) *L.* 40632 12 5½

Application.

(1)

He owes in all L. 2114 1 10¾

(2)	L.	s.	d.
Value of the Bond	1908	17	10½
Interest of do.	191	2	1½
amount L.	2100	0	0

(3)	L.	s.	d.
Wine cost	684	0	0
Loading &c.	17	13	8½
Storage	8	10	0
Custom	16	13	9½
Carriage	19	14	6¾
amount L.	746	12	0¾

(4)	L.	s.	d.
Widow's use	6436	0	0
Charities	297	14	8
1st Nephew	1546	14	8
2d do.	1546	14	8
3d do.	1546	14	8
1st Nice	1324	0	0
2d do.	1324	0	0
3d do.	1324	0	0
Executor	304	0	11
L.	15649	19	7

(5)	L.	s.	d.
First payment	13	18	9
2d do.	23	18	4¾
3d do.	47	0	9
Remainder	37	14	6½
Sum borrowed	122	12	5¾

(6)	L.	s.	d.
1st Horse	16	17	4
2d do.	16	17	4
3d do.	16	17	4
1st Cow	5	14	7
2d do.	5	14	7
3 Bushels wheat	0	18	10½
Amount	63	0	0½

(7)	L.	s.	d.
Brewer	42	3	3
Butcher	212	0	6
Baker	24	0	0
Chandler	13	8	0
Taylor	137	9	9
Draper	74	13	6
Rent	50	0	0
Servant's wages	46	5	0
took with him	100	0	0
Draws for L.	700	0	0

(8)	L.	s.	d.
A owes	109	19	11¾
C owes	109 109	19 19	11¾ 11¾
A & C	329	19	11¼
D as much	329	19	11¼
Sum due to B	659	19	10½

TROY-WEIGHT.

EXAMPLES.

(1)	lbs.	oz.	dwt.	gr.
	36	10	13	13

(2)	lbs.	oz.	dwt.	gr.
	346	8	18	20

(3)	lbs.	oz.	dwt.	gr.
	906	0	10	9

Application.

(1)	lb.	oz.	dwt.	gr.
	36	7	16	0
	48	7	0	16
	56	6	0	0
ans. lbs.	141	8	16	16

(2)		lb.	oz.	dwt.	gr.
3 Ingots	1st	9	7	14	0
	2d	9	7	14	0
	3d	9	7	14	0
4 do.	1st	8	5	15	16
	2d	8	5	15	16
	3d	8	5	15	16
	4th	8	5	15	16
Whole wt. lbs.		62	10	4	16

(3)		lb.	oz.	dwt.
4 Tankards	1st	0	7	18
	2d	0	7	18
	3d	0	7	18
	4th	0	7	18
Spoons		4	6	0
3 Salvers	1st	6	4	0
	2d	6	4	0
	3d	6	4	0
	answer	26	1	12

(4)	lb.	oz.	dwt.
14 Dishes wt.	18	3	14
36 Plates	48	1	15
6 Salts	5	7	0
4 Salvers	11	10	12
Whole wt.	83	11	1

(5)		lb.	oz.	dwt.	gr.
3 pr. Sleeve Buttons.	1st	0	0	0	11
	2d	0	0	0	11
	3d	0	0	0	11
Two Basins		1	5	4	14
2 pair Buckles	1st	0	2	11	0
	2d	0	2	11	0
	answer	1	10	7	23

(6)	lb.	oz.	dwt.	gr.
Dishes wt.	11	4	16	11
Plates 3 times as much	11	4	16	11
	11	4	16	11
	11	4	16	11
Salts	2	5	6	14
Tankards	6	7	14	17
answer	54	8	7	3

AVOIRDUPOIS WEIGHT.

EXAMPLES.

(1) T. C. qr. lb.
310 3 2 18

(2) C. qr. lb. oz. dr.
332 1 18 11 11

(3) C. qr. lb. oz. dr.
290 0 1 3 10

Application.

(1)

No.	C.	qr.	lb.
1	9	2	18
2	8	3	12
3	7	2	19
	26	0	21

(2)

No.	C.	qr.	lb.	oz.	dr.
1	0	1	19	14	12
2	0	2	1	11	10
3	2	2	11	14	10
4	0	3	6	9	15
	4	1	12	2	15

(3)

No.	C.	qr.	lb.
1	3	2	18
2	2	3	12
3	1	3	19
4	3	3	7
5	2	1	18
	14	2	18

(4)

No.	C.	qr.	lb.
1	2	2	0
2	2	1	16
3	2	0	3
4	2	3	0
5	2	1	12
6	2	1	16
	14	1	19

(5)

No.	C.	qr.	lb.
1	12	3	17
2	11	0	14
3	11	0	14
4	7	3	17
5	7	3	17
6	7	3	17
	58	3	12

(6)

	Qr.	lb.
1st Bag	2	15
2d	2	25
3d	2	25
4th	2	25
5th	2	25
6th	2	25
	4	1	0

APOTHECARIES WEIGHT.

Examples.

(1) lb. ℥ ʒ ℈ gr.
35 10 4 1 12

(2) lb. ℥ ʒ ℈ gr.
276 7 6 2 16

Application.

	℥	ʒ	℈	gr.
1st. Simple	3	4	1	0
2d	4	3	2	0
3d	0	4	0	18
4th	6	5	2	18
answer oz.	15	2	0	16

LONG MEASURE.

Examples.

(1) Deg. M. fur. P.
33 51 6 34

(2) Yds. ft. in. b.c.
3458 0 10 1

Application.

From Phila. to the	M.	fur.	P.
Blue Ball	20	3	30
Red Lion	40	2	16
Harris's ferry	42	3	9
Carlisle	17	0	0
Pittsburg	201	0	2
answer	321	1	17

CLOTH MEASURE.

EXAMPLES.

(1) Yds.	qr.	na.	(2) E.E.	qr.	na.	(3) E.F.	qr.	na.
296	2	0	311	1	1	370	4	2

Application.

(1)

	Yds.	qr.	na.
No. 1	27	2	3
2	41	3	3
3	36	1	2
4	33	2	1
answer yds.	139	2	1

(2)

	Yds.	qr.	na.
No. 1	382	0	2
2	382	0	2
3	407	3	2
4	407	3	2
5	407	3	2
6	223	1	1
7	223	1	1
8	223	1	1
9	223	1	1
10	223	1	1
Total yds.	3104	1	3

LAND MEASURE.

EXAMPLES.

(1) A.	R.	P.	(2) A.	R.	P.	(3) A.	R.	P.
324	2	35	2844	2	27	2509	1	34

Application.

(1)

	A.	R.	P.
One field	27	3	27
Another	17	3	36
A third	41	3	19
answer	87	3	2

(2)

		A.	R.	P.
One wheat field		37	0	23
One rye	do.	25	2	0
Two pasture fields	1st	17	1	11
	2d	17	1	11
In meadow		21	0	14
In wood land		42	2	26
answer		161	0	5

LIQUID MEASURE.

EXAMPLES.

(1) T.	hhd.	gal.	(2) Gal.	qt.	pt.	(3) Gal.	qt.	pt.
30	2	47	3468	1	0	10195	1	1

Application.

(1)

	Gal.	qt.	pt.
1st Vessel	120	2	1
2d	258	0	0
3d	136	0	0
4th	118	1	0
answer	632	3	1

(2)

	Gal.	qt.	pt.
The 4 First hhds. each	97	1	0
	97	1	0
	97	1	0
	97	1	0
2 last each	102	3	1
	102	3	1
answer	594	3	0

DRY MEASURE.

EXAMPLES.

	Bu.	P.	qt.
(1)	347	3	5
(2)	3651	1	3
(3)	11598	2	2

Application.

(1)

	Bu.	P.	qt.
	14	2	5
	23	3	0
	8	0	7
	19	1	0
	59	0	4
ans.	125	0	0

(2)

	Bu.	P.	qt.
4 Granaries each	87	2	0
	87	2	0
	87	2	0
	87	2	0
2 do. each	100	0	7
	100	0	7
answer	550	1	6

TIME.

EXAMPLES.

(1)

Years	m.	w.	d.
3393	9	1	5

(2)

Days	hr.	min.	sec.
3166	21	48	54

Application.

(1)

1st mo.	31 da.
2d	28
3d	31
4th	30
5th	31
6th	30
7th	31
8th	29
answer	241 st.

(2)

3 mo. 31–1	30 da.
4	30
5	31
6	30
7	31
8	31
9	30
10	31
11	19
answer	263

	Y.	m.	w.	d.
A's age	27	5	2	0
B's	25	0	0	0
C's	20	7	3	4
D's	17	0	0	4
E's	14	11	1	0
F's	14	11	1	0
G's	12	1	0	6
answer	131	11	1	0

MOTION.

EXAMPLES.

(2) 37° 46′ 30″ (2) 9 *sig.* 27° 38′ 42″

COMPOUND SUBTRACTION. OF MONEY.

(1) *L.* 4818 8 4¾ (2) *L.* 482 11 10¼ (3) *L.* 699 3 5½

Application.

(1)	*L.*	*s.*	*d.*
A	138	14	6
B	87	16	4½
answer.	50	18	1½

(3)	*L.*	*s.*	*d*
From	2000	0	0
1st payment	499	19	11¾
2d do.	1388	18	11
Take	1888	18	10¾
answer.	111	1	1¼

(2)	*L.*	*s.*	*d*
Brewer	756	17	0
Baker	437	17	8¾
in the baker's	318	19	3¼

(4)	*L.*	*s.*	*d.*
Principal	792	11	2½
Interest	193	12	9¾
From	986	4	0¼
received	190	17	4½
in	279	11	7¾
part	198	19	10¼
pay	98	12	9¾
Take	776	1	8¼
remains	210	2	4 unpaid.

(5)	*L.*	*s.*	*d.*
C.D's bill	75	0	0
R. Drawer's note	7	12	6
P. Johnson's do.	5	0	0½
Assig. on R. Dealer	17	13	9
Bank notes.	40	0	0
from 75*L.* deduct	70	6	3½
remains *L.*	4	13	8½

(6)				
From *L.*	74	17	0	= A's sum,
Take	49	13	6	= differ.
answer	25	3	6	= B's sum.

(7)	*L.*	*s.*	*d.*	
From	125111	10	6	
	11000	0	0	
	1111	11	11	
Take	12111	11	11	= Daughter's.
answer	12999	18	7	= Son's.

(8)		L.	s.	d.
He owes to	A	71	12	6
	B	34	9	9
	C	16	18	8
	D	44	0	0
	E	66	7	6
	F	11	2	3
	G	19	19	0
	H	20	0	0
From		284	9	8
Take		192	19	3
They lose		91	10	5 answer.

	L.	s.	d.
He had in cash	3	13	6
Commodities	23	10	0
Furniture	21	6	11
Tenement	56	15	0
Book debts	87	13	10
L.	192	19	3

TROY WEIGHT.

Example. (2) 29 lb. 0 oz. 6 dwt. 20. gr.

Application.

(1)	lb.	oz.	dwt.	gr.
From	637	9	0	8
Take	288	10	9	20
	348	10	10	12

(2)	lb.	oz.	dwt.	gr.
From	204	6	10	0
Take	108	6	1	13
	95	11	18	11

AVOIRDUPOIS WEIGHT.

(1) T.	C.	q.	lb.	(2) T.	C.	qr.	lb.	(3) C.	qr.	lb.	oz.	dr.
23	18	0	22	27	18	0	17	10	1	18	15	6

Application.

(1)	C.	qr.	lb.
From	45	1	7
Take	39	0	20
Remains	6	0	15

(2)	T.	C.	qr.	lb.
From	17	7	2	0
Take	0	12	3	9
Remains	16	14	2	19

(3)	C.	qr.	lb.		lb.
1st Cask	1	3	12	Tare	17
2d	1	3	12		17
3d	1	3	12		17
4th	1	3	12		17
5th	1	3	12		17
6th	1	3	12		17
From	11	0	16	3	18
Take	0	3	18 tare		
answer	*10*	*0*	*26*		

(4)	C.	qr.	lb.		qr.	lb.
2 first hhds.	37	3	0	Tare	3	17
3d	13	2	4		1	10
4th	13	2	4		1	10
	64	3	8	1	2	9
	1	2	9tare			
answer	63	0	27 neat wt.			

APOTHECARIES WEIGHT.

EXAMPLES.

	lb.	℥	ʒ	℈	gr.
(1)	2	3	1	0	13
(2)	11	3	4	2	2

Application.

(1)	lb.	℥	ʒ	℈	gr.
	3	3	1	1	12
	1	7	0	2	18
rem. left	1	8	0	1	14

(2)	lb.	℥	℥	℈	gr.
From	17	11	6	2	0
First parcel	3	5	4	1	17
Second do.	3	5	4	1	17
Third do.	3	5	4	1	17
Take	10	4	5	2	11
Left	7	7	0	2	9

LONG MEASURE.

EXAMPLES.

(1)	Deg.	M.	fur.	P.
	2	4	6	25

	Yds.	ft.	in.	b.c.
(2)	175	2	5	1
(3)	76	2	3	2

Application.

(1)	L.	M.	fur.	P.	yd.
	50	2	1	0	0
	19	0	0	18	4
rem.	31	2	0	21	1½

(2)	M.	fur.	P.
1st day	21	5	0
2d	40	0	26
3d	5	4	0
B travels	67	1	26

	M.	fur.	P.
1st day	60	0	0
2d	57	0	35
3d	52	6	0
C travels	169	6	35

	M.	fur.	P.
Then from	327	0	0
	67	1	26
	169	6	35
Take	237	0	21
They are asunder	89	7	19

CLOTH MEASURE.

EXAMPLES.

(1)	Yds.	qr.	na.
	27	2	3

(2)	E.F.	qr.	na.
	22	1	2

(3)	E.E.	qr.	na.
	66	4	3

Application.

(1)	E.E.	qr.	na.
From	156	0	0
Take	50	1	1
rem.	105	3	3

(2)	Yd.	qr.	na.	in.
From	856	0	0	0
Take	200	2	1	1
rem.	655	1	2	1¼

(3) Yds. qr. na. Yds. qr. na.

27 2 3+27 2 3+27 2 3+27 2 3=110 3 0

−87 3 0

remains 22 3 1

(4) Yds. qr. na.

42+42+42=126 0 0

yd. yd. qr. na.

42+27 1 2=69 1 2

answer 56 2 2

LAND MEASURE.

EXAMPLES.

(1) A. R. P.	(2) A. R. P.	(3) A. R. P.
67 2 28	63 1 3	325 1 19

Application.

(1)	A.	R.	P.
From	780	2	0
Take	396	3	15
	383	2	25

(2)	A.	R.	P.	
From	4780	3	30	
	1784	3	24	=A's
	1658	2	36	=B's
Take	3443	2	20	
rem.	1337	1	10	=C's

(3)	A.	R.	P.
Bought at sundry times	47	0	0
	174	0	37
	200	3	0
	470	3	0
From	892	2	37
First sale	300	0	27
Second	275	0	0
Take	575	0	27
Acres	317	2	10 left.

LIQUID MEASURE.

EXAMPLES.

(1) T. hhd. gal.	(2) T. hhd. gal.	(3) Hhd. gal. qt. pt.
7 2 22	13 1 13	7 54 2 1

Application.

(1)	T.	hhd.	gal.	qt.
From	2	0	0	0
Take	0	3	15	3
answer	1	0	47	1

(2)	Gal.	qt.	pt.
From	10007	0	0
Take	4005	2	1
remains	6001	1	1

(3)	Gal.	qt.	pt.
Bought of A	174	3	0
——of B {	174	3	0
	174	3	0
	7	0	1
	531	1	1
C as much as A&B	531	1	1
	1062	3	0

then from	1062	3	0
Sold to D	197	0	1
to E {	197	0	1
	197	0	1
	197	0	1
	10	3	0
Take	799	1	0
remains	263	2	0

DRY MEASURE.

EXAMPLES.

(1) Bu.P.qt.	(2) Bu.P.qt.	(3) Bu.P.qt.
12 2 5	43 2 4	273 0 5

Application.

(1)	Bu.	P.	qt.	pt.
From	27	1	0	0
Take	18	2	0	1
ans.	8	2	7	1

(2)	Bu.	P.	qt.
	1000	0	7
	734	1	5
	265	3	2

(3)	Bu.	P.	qt.
	500	0	0
	375	2	6
	124	1	2

TIME.

Examples. (1)	Y.	m.	w.	d.
	809	5	1	4

(2)	D.	hr.	min.	sec.
	165	23	59	59

Application.

(1)	Y.	m.	w.	d.	h.	min.	sec.
From	200	0	0	0	0	0	0
Take	98	3	0	0	8	0	10
answer	101	9	3	6	15	59	50

(2)	Y.	m.	w.	d.
From	6	0	0	0
Take	5	8	3	4
Facit		4	0	3

(3)	Y.	m.	w.	d.
From	14	0	0	0
	11	11	0	0
11 weeks =		2	3	0
11 days =		0	1	4
Take	12	1	0	4
answer	1	11	3	3

(5)	Y.	m.	d.
From	1771	4	9
Take	1765	2	21
difference	6	1	16

(6)	Y.	m.	d.
From	1789	10	12
Take	1787	2	22
The time	2	7	18

Take	1775	2	26	
	3	9	27	dif. o

Y.	m.	d.	Y.	Y.	m.	d.	
1775	2	26+	21=	1796	2	26	the ti
1777	9	21+	21=	1798	9	21	do. f
1778	12	25+	21=	1799	12	25	do. f

(8)	Y.	m.	d.		Y.	m.	d
From	1764	6	16	From	1790	1	1
Take	1746	6	13	Take	1746	6	13
	18	0	3		43	6	18
deduct	0	0	11		0	0	11
differ.	17	11	22		43	6	7

MOTION.

EXAMPLES.

(1) 3° 53′ 33″ (2) 3*sig.* 28° 27′ 26″

Application.

(1)	*sig.*	°	′	″	
From	7	2	17	51	Fr
Take	3	12	51	57	T
Remainder	4	8	25	54	a

(7) Deg. m. fur. P.
34 34 7 20

(8) Yds. ft. in. b. c.
1127 0 10 0

(9) Yds. qr. na.
342 0 2

(10) E.F. qr. na.
276 2 0

(11) E.E. qr. na.
619 3 1

(12) A. R. P.
789 3 0

(13) T. hhd. gal. qt. pt.
54 3 6 2 1

(14) Bu. P. qt.
467 2 4

(15) Y. m. w. d.
5721 11 2 2

(16) D. hr. m. sec.
221 10 53 36

(17) *sig.* ° ′ ″
7 9 15 40

(18) *sig.* ° ′ ″
32 23 32 6

CASE 1.

EXAMPLES.

(2) *s. d.*
Mul. 7 6
by 5
L. 1 17 6

(3) *L. s. d.*
1 18 6
6
11 11 0

(4) *s. d.*
2 10½
3
8 7½

(2) *s. d.*
3 9
10
1 17 6

(3) *s. d.*
19 3
12
11 11 0

(4) *s. d.*
0 11½
9
8 7½

(5) *L. s. d.*
2 14 8¾
11
30 2 0¼

(6) *s. d.*
9 11¼
4
1 19 9

(6)
3 3¾
12
1 19 9

CASE 2.

EXAMPLES.

(2) *s. d.*
16 at 7 10
4×4=16
1 11 4
4
6 5 4

(2) *s. d.*
32 at 3 11
4×8=32
15 8
8
6 5 4

30 17 7½

L. s. d.
0 17 11½
5×10=50
4 9 9½
10
44 17 11

L. s. d.
t 7 9 6
6×11=66
44 17 0
11
93 7 0

L. s. d.
9 18 11½
6×12=72
59 13 9
12
16 5 0

Facit 30 17 7½

(4) L. s. d.
100 at 0 8 11¾
10×10=10
4 9 9½
10
Facit 44 17 11

(5) L. s. d.
132 at 3 14 9
11×12=
41 2 3
12
Facit 493 7 0

(6) L. s. d.
144 at 4 19 5¾
12×12=14
59 13 9
12
Facit 716 5 0

CASE 3.

(3)	*L.*	*s.*	*d.*
58 at	0	0	9½×4
			6×9+4=58
	0	4	9
			9
	2	2	9
	0	3	2
Facit	2	5	11

(4)	*L.*	*s.*	*d.*
74 at	0	12	8×2
			9×8+2=74
	5	14	0
			8
	45	12	0
	1	5	4
Facit	46	17	4

(5)	*L.*	*s.*	*d.*
76 at	0	15	11½×1
			7×11—1=76
	5	12	8½
			11
	61	8	9½
	—0	15	11½
Facit	60	12	10

(6)	*L.*	*s.*	*d.*
78 at	8	7	0×1
			7×11+1=78
	58	9	0
			11
	642	19	0
	+8	7	0
Fa.	651	6	0

(3)	*L.*	*s.*	*d.*
116 at	0	0	4¾×8
			9×12+8=116
	0	3	6¾
			12
	2	2	9
	0	3	2
Facit	2	5	11

(4)	*L.*	*s.*	*d.*
148 at	0	6	4×4
			12×12+4=148
	3	16	0
			12
	45	12	0
	+1	5	4
Facit	46	17	4

(5)	*L.*	*s.*	*d.*
152 at	0	7	11¾×8
			12×12+8=152
	4	15	9
			12
	57	9	0
	+3	3	10
Facit	60	12	10

(6)	*L.*	*s.*	*d.*
156 at	4	3	6×12
			12×12+12=156
	50	2	0
			12
	601	4	0
	+50	2	0
Facit	651	6	0

CASE 4.

EXAMPLES.

(2)	L.	s.	d.
195 at	0	1	2×5
			10
	0	11	8×9
			10
	5	16	8
	5	5	0
	0	5	10
L.	11	7	6

(2)	L.	s.	d.
390 at	0	0	7
			10
	0	5	10×2
			10
	2	18	4
			3
	8	15	0
	2	12	6
L.	11	7	6

(3)	L.	s.	d.
407 at	0	3	3×7
			10
	1	12	6
			10
	16	5	0
			4
	65	0	0
	1	2	9
Facit	66	2	9

(3)	L.	s.	d.
814 at	0	1	7½×4
			10
	0	16	3×1
			10
	8	2	6
			8
	65	0	0
	0	16	3
	0	6	6
Facit	66	2	9

(4)	L.	s.	d.
875 at	0	14	3×5
			10
	7	2	6×7
			10
	71	5	0
			8
	570	0	0
	49	17	6
	3	11	3
Facit	623	8	9

(4)	L.	s.	d.
1750 at	0	7	1½
			10
	3	11	3×5
			10
	35	12	6×7
			10
	356	5	0
	249	7	6
	17	16	3
Facit	623	8	9

(5)	L.	s.	d.	
3540 at	2	5	0	
			10	
	22	10	0	×4
			10	
	225	0	0	×5
			10	
	2250	0	0	
			3	
	6750	0	0	
	1125	0	0	
	90	0	0	
facit	7965	0	0	

(5)	L.	s.	d.	
7080 at	1	2	6	
			10	
	11	5	0	×8
			10	
	112	10	0	
			10	
	1125	0	0	
			7	
	7875	0	0	
	90	0	0	
Facit	7965	0	0	

(6)	L.	s.	d.	
286573 at	4	3	9	×3
			10	
	41	17	6	×7
			10	
	418	15	0	×5
			10	
	4187	10	0	×6
			10	
	41875	0	0	×8
			10	
	418750	0	0	
			2	
	837500	0	0	
	335000	0	0	
	25125	0	0	
	2093	5	0	
	293	2	6	
	12	11	3	
Facit	1200024	8	9	

Application.

EXAMPLES.

(1)	L.	s.	d.
	1	11	5
			9
ans.	14	2	9

(2)		s.	d.
		9	6
			12
L.	5	14	0

(3)	L.	s.	d.
	1	14	6
			6×7=42
	10	7	0
			7
L.	72	9	0

(4)		s.	d.
		18	11½
			9
	8	10	7½
			11
L.	93	16	10½

(5)		s.	d.
		13	4
			12×12=144
	8	0	0
			12
L.	96	0	0

(6)		s.	d.
		7	10×1
			6×10−1=59
	2	7	0
			10
	23	10	0
	—0	7	10
L.	23	2	2

(7)	L.	s.	d.
	1	2	3×7
			10×11+7
	11	2	6
			11
	122	7	6
	+7	15	9
L.	130	3	3

(8)		s.	d.
		6	8×8
			10
	3	6	8×9
			10
	33	6	8
	30	0	0
	2	13	4
L.	66	0	0

(9)	L.	s.	d.
	1	2	6×5
			10
	11	5	0×7
			10
	112	10	0
			2
	225	0	0
	78	15	0
	5	12	6
L.	309	7	6

(10)		s.	d.
		2	5
			10
	1	4	2
			10
	12	1	8
			3
	36	5	0
	3	12	6
	0	14	6
L.	40	12	0

(11) *s.* *d.*
0 11¾
10
9 9½×5
10
4 17 11
3
14 13 9
2 8 11½
L. 17 2 8½

(12) *L.* *s.* *d.*
3 8 11¼×9
10
34 9 4½×3
10
344 13 9
7
2412 16 3
103 8 1½
31 0 5¼
L. 2547 4 9¾

(13) *s.* *d.*
15 3
4×6=24
3 1 0
6
L. 18 6 0

(14) *s.* *d.*
5 6
9×11−1=98
2 9 6
11
27 4 6
—0 5 6
L. 26 19 0

(15) *s.* *d.*
0 7½×2
10
6 3×7
10
3 2 6
6
18 15 0
2 3 9
0 1 3
L. 21 0 0

(16) *s.* *d.*
14 6
10
7 5 0×4
10
72 10 0
2
145 0 0
29 0 0
L. 174 0 0

(17) *L.* *s.* *d.*
1 12 6×5
10
16 5 0×6
10
162 10 0
3
487 10 0

then 487 10 0
97 10 0
8 2 6
593 2 6
294 12 6
L. 887 15 0

(18) *d.* *s.* *d.*
18=1 6×4
10
15 0×4
10
7 10 0×3
10
75 0 0
22 10 0
3 0 0
0 6 0
L. 100 16 0

(19) *s.* *d.*
7 6×5
10
3 15 0×6
10
37 10 0
3
112 10 0
22 10 0
1 17 6
L. 136 17 6

(20) w. d. *d.* *s.* *d.*
52×6+1=313 at 2 6×3
10
1 5 0×1
10
12 10 0
3
37 10 0
1 5 0
0 7 6
L. 39 2 6

(21) *s.* *d.*
12 6
10
6 5 0
10
62 10 0
10
answer *L.* 625 0 0

(22) *s.* *d.*
19 11×5
10
9 19 2×6
10
99 11 8
3
298 15 0
59 15 0
4 19 7
L. 363 9 7

L. *s.* *d.*
From 500 0 0
Take 363 9 7
Lays up 136 10 5

Note. The answer to the 23d and such like questions, may be more concisely obtained, by deducting the prime cost *of* 1 lb. &c. from the selling price, and multiplying the remainder by the quantity : the product will be the gain on [illegible] *whole.*

(23)

		s.	*d.*
504×6=3024 at		0	$8\frac{1}{2}$×4
			10
		7	1×2
			10
	3	10	10
			10
	35	8	4
			3
	106	5	0
		14	2
		2	10
Bought for	107	2	0

		s.	*d.*
again 3024 at		0	$9\frac{1}{4}$×4
			10
		7	$8\frac{1}{2}$×2
			10
	3	17	1
			10
	38	10	10
			3
	115	12	6
	0	15	5
	0	3	1
Sold for	116	11	0

	L.	*s.*	*d.*
From	116	11	0
Take	107	2	0
gained	9	9	0

(24)

		s.	*d.*
20×25=500 at		2	$7\frac{1}{2}$
			10
	1	6	3
			10
	13	2	6
			5
Prime cost	65	12	6

		s.	*d.*
500 at		2	$10\frac{1}{2}$
			10
	1	8	9
			10
	14	7	6
			5
Sold for *L.*	71	17	6
—	65	12	6
Gained	6	5	0

COMPOUND DIVISION.

EXAMPLES.

(1) *L.* 36 18 8

(2) *L.* 3288 19 $11\frac{3}{4}$

(3) *L.* 1921 8 5

(4) *L.* 1951 19 $3\frac{3}{4}$

(5) lb.oz.dwt.gr.
8 4 15 14

(6) T.C.qr.lb.
15 6 0 $13\frac{2}{6}$

(7) lb. ℥ ʒ ℈ gr.
1 4 7 2 $8\frac{2}{7}$

(8) Deg.M.fur.P.
5 13 4 $39\frac{4}{5}$

(9) Y.ft.in.b.c.
2 0 3 $1\frac{5}{9}$

(10) Yds.qr.na.
6 3 $0\frac{6}{10}$

(11) A. R.P.
162 1 $32\frac{1}{11}$

(12) T.hhd.gal.qt.
2 1 17 $3\frac{2}{12}$

(13) Bu. P. qt.
39 2 $7\frac{10}{12}$

(14) Y. m. w. d.
299 8 1 $6\frac{5}{6}$

(15) D. hr. min. sec.
1 17 58 5

(16) Sig. ° ′ ″
1 13 51 7

CASE 1.

EXAMPLES.

(2) L. s. d.
5)1 8 4
Quoti. 0 5 8

(3) L. s. d.
7)3 19 9¼
0 11 4¾

(4) L. s. d.
9)4 8 6
0 9 10

(5) L. s. d.
10)3 15 0
0 7 6

(6) L. s. d.
11)9 17 9¼
0 17 11¾

(7) L. s. d.
6)11 11 3
1 18 6½

(8) L. s. d.
12)23 2 6
Facit 1 18 6½

CASE 2.

(2) L. s. d.
3)3 10 10½
9)1 3 7½
0 2 7½

(3) L. s. d.
7)52 10 0
8)7 10 0
0 18 9

(4) L. s. d.
8)372 16 0
12)46 12 0
3 17 8

(5) L. s. d.
10)225 0 0
12)22 10 0
1 17 6

(6) L. s. d.
8)474 0 0
9)59 5 0
6 11 8

(7) L. s. d.
12)948 0 0
12)79 0 0
6 11 8

CASE 3.

(2) L. s. d. L. s. d.
38)6 6 8(0 3 4
20
38)126
114
12
12
38)152
152

(3) L. s. d. L. s. d.
74)46 17 4(0 12 8
20
74)937
74
197
148
49
12
74)592
592

(4) *L.* *s.* *d.*
95)189 14 0(1*l.* 19 11
95
94
20
95)1894
95
944
855
89
12
95)1068
95
118
95
remains 23

(5) *L.* *s.* *d.*
106)310 12 0½(2*l.* 18 7¼
212
98
20
106)1972(18*s.*
106
912
848
64
12
106)768(7*d.*
742
26
4
106)106(¼
106

(6) *L.* *s.* *d.*
654)3236 12 4½(4 18 11¾
2616
620
20
654)12412(18*s.*
654
5872
5232
640
12
654)7684(11*d.*
654
1144
654
490
4
654)1962(3qrs.
1962

Application.

(1) *s.* *d.*
4)17 6
4 4½

(2) *L.* *s.* *d.*
8)3 11 8
0 8 11½

(3) *L.* *s.* *d.*
12)3 3 0
0 5 3

(4) *L.* *s.* *d.*
4)18 6 0
6) 4 11 6
0 15 3

(5) *L.* *s.* *d.*
6)17 13 6
7) 2 18 11
0 8 5

(6) *L.* *s.* *d.*
10)83 6 8
10) 8 6 8
0 16 8

(7) *L.* *s.* *d.*
58)2 5 11
20
45
12
58)551(9*d.*
522
29
4
58)116(2 qrs.
116
ans. 9*d.*½ per lb.

(8) *L.* *s.* *d.*
230)26 16 8
20
230)536(2*s.*
460
76
12
230)920(4*d.*
920
ans. 2*s.* 4*d.* per. Bu.

(9) *L.* *s.* *d.*
814)66 2 9
20
814)1322(1*s.*
814
508
12
814)6105(7*d.*
5698
407
4
814)1628(2 qrs.
1628
answer 1*s.* 7*d.*½

(10) *L.*
3540)7965(2*l.* 5*s.* each.
7080
885
20
3540)17700(5*s.*
17700

(11) *L.* *s.* *d.*
5×20=100 { 10)94 3 4
10) 9 8 4
answer 0 18 10

(12) *L.* *s.* *d.*
144 { 12)57 0 0
12) 4 15 0
answer 0 7 11

(13) *L.* *s.* *d.*
400)14 3 4
20
283
12
4,00)34,00
answer 8*d.*½

(14)

	L.	*s.*	*d.*		*L.*	*s.*	*d.*	
	173	13	9	÷4=	43	8	5¼	A.
	147	11	4	÷2=	73	15	8	B.
	128	9	11	×3÷4=	96	7	5¼	C.
				Sum left	213	11	6½	answer

(15)

	L.	*s.*	*d.*	
From	1000	0	0	
1000 { ÷3=	333	6	8	Wife's legacy.
÷4=	250	0	0	Eldest Son's do.
Take	583	6	8	
2)	416	13	4	
answer	208	6	8	each of the other Son's.

REDUCTION.

EXAMPLES.

(3) $\frac{1}{10}$85 cts.
— 8½
answer 76½*d.*

(5) $\frac{1}{9}$73*d.*
+ 8$\frac{1}{9}$
answer 81$\frac{1}{9}$

(6) 742 dols.
×1000m.=1 dol.
answer 742000 mills.

(7) 1,0)7546,0m.
1,00)75,46 cts.
ans. 75d.46 cts.

(8) dimes.m.
149,33=1 doub.
× 12
Fac. 1791d.96 m.

(9) D.cts.
4,44=1*L.*
× 100
Facit. 44E.4d.00 ct.

(10)
460cts.=1 Guin.
50
23000 Facit.

(11) *L.* *s.* *d.*
2691 13 2
20
53833
12
Facit 645998*d.*

(12)
12)87600
2,0)730,0
Facit 365 *L.*

(13) 12)322999
2,0) 2691,6 7*d.*
Facit *L.* 1345 16 7

(14) *L.* *s.* *d.*
916 10 9¾
20
18330 *s.*
12
219969*d.*
4
ans. 879879 qr*s*.

(15) *L.* *s.* *d.*
77 14 7½
20
1554 *s.*
12
18655*d.*
2
ans. 37311 half *d.*

(16) Qrs.
4)879879
12)219969¾
2,0) 1833,0 9*d.*
ans. *L.* 916 10 9¾

(17) 2)37311 half *d.*
12)18655½
2,0)155,4 7*d.*
ans. 77 14 7½

(18) 1678dols.
15 six *d.* = 1d.
Facit 25170 six *d.*

(19) 728 dols.
90*d.* = 1d.
65520 *d.*
4
ans. 262080 qrs.

(20) 4)262080 qrs. then 728
9,0) 6552,0 *d.* 3
728 dols. 8)2184
ans. 273*l.*

(21) D. c. m.
4, 66 2 = 1 Guinea.
85
23310
37296
answer 396, 27cts.

(22)
450 Moidores,
6 dols. = 1 Moidore
answer 2700 dols.

(23) *L.* *s.* *d.*
137 15 6¾
20
2755
12
33066
4
4)132267 qrs. Facit.
12)33066¾
2,0)275,5 6*d.*
Proof 137 15 6¾

(24) *L.* *s* *d.*
275 11 1½
20
5511
12
66133
2
2)132267 half *d.* Facit.
12)66133½
2,0)5511,1 1*d.*
Proof 275 1 1½

(25) 5)630
ans. 126 dols.

(26) 728 dols.
3
8)2184
ans. 273*l.*

(27) 546*l.*
8
3)4368
ans. 1456 dols.

(28) 537 dols.
3
8)1611
ans. *L.* 201 7 6

(29) 402*l.* 15
8 +6
3)3222
answer 1074 dols.

(30) *L.* *s.* *d.*
697 2 6
20
13942
12
1 Cr.=99*d.*)167310(1690 ans.
99
683
594
891
891
0

or thus *L.* *s.* *d.*
697 2 6
8
3)5577
11)1859 dols.
— 169
answer 1690 Cr.

(31) 845 French Cr.
99
7605
7605
12)83655 *d.*
2,0)697,1 3
answer *L.* 348 11 3

(32) $\frac{1}{11}$)891 dols.
— 81
answer 810 Fren. Cr.

(33) $\frac{1}{10}$)1620 Fren. Cr.
+ 162
answer 1782 dols.

(34) 2,0)678 Eng. guin.
+ 33 18
L. 711 18 Sterl.
again 678
7
4)4746
answer 1186 10 currency.

(35) six pences *L.* *s.*
A Crown=10)279 13
½ Crown = 5 20
Shilling = 2 5593
— 2
17)11186(658 of each
102
98
85
136
136

Application.

EXAMPLES.

(1)	L.	s.	d.
	1	11	5
			9
ans.	14	2	9

(2)		s.	d.
		9	6
			12
L.	5	14	0

(3)	L.	s.	d.	
	1	14	6	
			6×7=42	
	10	7	0	
			7	
L.	72	9	0	

(4)		s.	d.
		18	11½
			9
	8	10	7½
			11
L.	93	16	10½

(5)		s.	d.
		13	4
			12×12=144
	8	0	0
			12
L.	96	0	0

(6)		s.	d.
		7	10×1
			6×10−1=59
	2	7	0
			10
	23	10	0
	−0	7	10
L.	23	2	2

(7)	L.	s.	d.
	1	2	3×7
			10×11+7
	11	2	6
			11
	122	7	6
	+7	15	9
L.	130	3	3

(8)		s.	d.
		6	8×8
			10
	3	6	8×9
			10
	33	6	8
	30	0	0
	2	13	4
L.	66	0	0

(9)	L.	s.	d.
	1	2	6×5
			10
	11	5	0×7
			10
	112	10	0
			2
	225	0	0
	78	15	0
	5	12	6
L.	309	7	6

(10)		s.	d.
		2	5
			10
	1	4	2
			10
	12	1	8
			3
	36	5	0
	3	12	6
	0	14	6
L.	40	12	0

(11) *s.* *d.*
0 11¾
10
9 9½×5
10
4 17 11
3
14 13 9
2 8 11½
L. 17 2 8½

(12) *L.* *s.* *d.*
3 8 11¼×9
10
34 9 4½×3
10
344 13 9
7
2412 16 3
103 8 1½
31 0 5¼
L. 2547 4 9¾

(13) *s.* *d.*
15 3
4×6=24
3 1 0
6
L. 18 6 0

(14) *s.* *d.*
5 6
9×11−1=98
2 9 6
11
27 4 6
—0 5 6
L. 26 19 0

(15) *s.* *d.*
0 7½×2
10
6 3×7
10
3 2 6
6
18 15 0
2 3 9
0 1 3
L. 21 0 0

(16) *s.* *d.*
14 6
10
7 5 0×4
10
72 10 0
2
145 0 0
29 0 0
L. 174 0 0

(17) *L.* *s.* *d.*
1 12 6×5
10
16 5 0×6
10
162 10 0
3
487 10 0

then 487 10 0
97 10 0
8 2 6
593 2 6
294 12 6
L. 887 15 0

(5) lb. oz.dwt.
9 7 10
12
oz.dwt.
5 10 115
20 20
11,0) 2310
answer 21 spoons.

(6) dwt.
10=½oz.
24
24,0)456,0(19 answer.
24
216
216

(7) lbs. oz.dwt.gr. lbs.oz.dwt.
2 1 15 0×12= 25 9 0
1 3 15 22×12= 15 9 11
answer lbs. 41 6 11

(8) lb.oz.
19 3
12
11)231
ans. 21 porringers

AVOIRDUPOIS WEIGHT.

EXAMPLES.

(1) 15 Tons
20
300 Cwt.
4
1200 qrs.
28
9600
2407
ans. 33600 lbs.

(2) $28=\begin{cases}4)67200\\7)16800\end{cases}$
4)2400
2,0)60,0C.
ans. 30 T.

(3) C. qr. lb.
9 0 5
4
36
28
293
72
1013
16
ans. 16208oz.

(4) Drams.
$16=\begin{cases}4)20571005\\4)\ 5142751\ 1\end{cases}$
$16=\begin{cases}4)\ 1285687\ 13\text{ dr.}\\4)\ 321421\ 3\end{cases}$
$28=\begin{cases}4)\ 80355\ 7\text{oz.}\\7)\ 20088\ 3\end{cases}$
4) 2869 23lb.
2,0) 71,7 1qr.
Tons 35 17 1 23 7 13

(5) C.qr. lb.
2 2 11
6
15 2 10
4
62
28
496
125
answer 1746 lbs.

(6) 235 Parcels.
52
470
1175
28= { 4)12220
7) 3055
4) 436 12 lb.
answer C. 109 0 12 lb.

(7) C. qr. lb.
17 1 6
4
69
28
558
138
34)1938(57 Parcels.
170
238
238

(8) 12)3492 lbs.
28= { 4)291
7) 72 3
4) 10 11 lb.
C. 2 2 11

APOTHECARIES WEIGHT.

EXAMPLES.

(1) 17 lbs.
12
204 oz.
8
1632 dr.
3
answer 4896 scru.

(2) 2,0)133200,5 grs.
3) 66600 5
8)22200
12)2775
answer 231lb. 3dr. 5gr.

(3) 5 lb.
12
60
8
16= { 4)480
4)120
answer 30 parcels

(4) 24 drams.
20 parcels.
8)480
12) 60
answer 5 lb.

LONG MEASURE.

EXAMPLES.

(1)
273 miles.
8
2184
40
½) 87360
5½
436800
43680
480480
3
1441440
12
answer 17297280 inches.

(2)
12)34594560
3) 2882880
960960
2
11)1921920
4,0)17472,0
8)4368
ans. 546 miles.

(3)
M.fur.P.yds.ft in.
2 1 8 3 0 2
8
17
40
½) 688
5½
3443
344
3787
3
11361
12
ans. 136334 inches.

(4) b.c.
3)2280060
12)760020
3)63335
21111 2 feet.
2
11) 42222
4,0) 383,8 2yd.
8) 95 38 P.
answer 11m.7f.38p.2y.2f.

(5)
150 miles.
8
1200
40
½)48000
5½
240000
24000
264000

264000
3
792000
12

ft. in.
18 4
12
22,0 } 2)950400|0
11)475200

answer 43200

(6) Revolutions.
ft. in. 86400
18 4×12=220 in.
1728000
1728
12)19008000
3) 1584000
528000
2
11)1056000
4,0)9600,0
8)2400
answer 300 miles.

(7) ½)360 degrees.
69½
3240
2160
180
25020
8
200160×40
½)8006400
5½
40032000
4003200
ans. 44035200 yards.

CLOTH MEASURE.

EXAMPLES.

(1) Yds.qr.na.
15 3 1
4
63
4
answer 253

(2) na.
4)1012
4)253
answer 63yds.1qr.

(3) E.F.
73
3
ans. 219 qrs.

(4) na.
4)1752
3)438
answer. 146 E.F.

(5) na.
4)1408
5) 352
answer 70 E.E. 2qr.

(6) Bales.
10
10
100
12
ans. 1200 yds.

(7) Yds.qr.
408 3
4
3)1635
545 E.F.
3
5)1635
answer 327 E.E.

(8) Bales.
4
12
48 pieces.
24
192
96
1152 E.E.

then 1152 E.E.
5
4)5760
1440 yds.
4
3)5760
ans. 1920 E.F.

LAND MEASURE.

EXAMPLES.

(1) A. R. P.
27 1 32
4
109
40
answer 4392 perches.

(2) Perches.
4,0)439,2
4)109 32 P.
answer 27A.1R.32P.

(3) A. R. P.
1st Field 6 2 36
2d do. 10 0 0
3d do. 12 1 0
28 3 36
4
115
40
76)4636(61 shares.
456
76
76

(4) Perches.
25= { 5)1299600
5) 259920
4,0)5198,4=Per. in each.
4)1299 24P.
answer 324A.3R.24P.

LIQUID MEASURE.

EXAMPLES.

(1) 19 hhds.
63
57
114
1197 gals.
4
4788 qts.
2
9576 pints.

(2) 2)19152 pints.
4)9576 qts.
63= { 7)2394 gal.
9) 342
answer 38 hhds.

(3) ½)11 Bar.
1 Bar.=31½ gal.
11
33
05 2qt.
346 2
4
answer 1386 quarts.

(4) 165 gal.
a gallon=8 pts. 4
a quart =2 660
a pint =1 2
division 11)1320 pints.
12) 120
answer 10 doz.

DRY MEASURE.

EXAMPLES.

(1) Bu.P.qt.
17 0 5
4
68
8
549 qts.
2
answer 1098 pints.

(2) Pts.
2)5054
8)2527
4) 315 7qts.
answer 78bu.3p.7qts.

(3) Bu. P. qt.
One granary contains 65 1 6
4
Bu.P.
5 2 261 3 0
4 4
22)1047(47 Sacks.
88
167
154
13 pecks over,=3bu. 1p.

TIME.

EXAMPLES.

(1) w. d.
37 5
7
264
24
1056
528
6336

6336
60
answer 380160 min.

(2) seconds.
6,0)2479680,0
6,0) 41328,0
24={ 4)6888
6) 1722
7) 287
answer 41 weeks.

(3) D. hr.
A Year=363 6
24
1466
730
8766 hours.
60
525960 min.
60
answer 31557600 sec.

(4) 4004 Years.
1790
¼)5794
365¼
28970
34764
17382
1448$\frac{2}{4}$ day=12 hours.
answer 2116258D. 12hr.

MOTION.

EXAMPLES.

(1) 6 sig.
30
180
60
answer 10800 min.

(2) A revolution=360 deg.
60
21600
60
answer 1296000 sec.

Application.

(1) 4)400
100
3
8)300
Facit L. 37 10

(2) A mark=$\frac{2}{3}$ *L.*
therefore mul. *L.* 496 13 4
by 3+2
2)1490
answer 745 marks.

(3) 1260 Moid.
9
7)11340
answer 1620 Eng. guineas.

(4) s. d. 4 7 12 — 52 2 — 110 ×476 —)52360

s. d. 5 6½ 12 — 66 2 — 133

then 133)52360(393 Duca.
399
1246
1197
490
399
remains 91 ½d.=3*s*.9*d*.½over

(5) *L. s. d.* 6 17 3½
20
137
12
1647
2
3295

L. s. d. 123 11 3
20
2471
12
29655
2
59310

then 3295)59310(18 ans.
3295
26360
26360

(6) 36 oz.
8
12)288
answer 24 plates.

(7) Gallons.
Pipes 250×126 =31500
Hhds. 130× 63 = 8190
half do. 150× 31½= 4725
44415 gals. in all.
8=pints in 1 gal.
28= { 4)355320 lbs.
7) 88830
4) 12690
2,0) 317,2 2qrs.
Facit 158T.12.C.2qr.

(8) C. qr. lb.
2 1 14
4
9
28
266
28
7448

then 38)7448(196 canisters
38
364
342
228
228

(9) C. qr. lb.
4 3 24
2
9 3 20
6 9
8 9
12 9
16 104
42)1112(26 of each, and 20lb. over
84
272
252
rem. 20 lb.

(10) Deg.
½(360
69½
3240
2160
180
25020 miles.
8
200160 fur.
40
½)8006400 per.
5½
40032000
4003200
44035200 yds.
3
132105600 ft.
12
1585267200 in.
3
4755801600 b.c. ans.

(11) C. qr.
7 2
7
7
756
840 lbs. in 1 hhd.
2
24)1680 70 boxes.
168
0

(12) C. qr. lb.
12 1 10
4
49
25
245
99
1235 lbs in 1 hhd.
56
7410
6175
69160

then 112)69160(617 2 ans.
672
196
112
840
784
56 lbs=2 qrs.

(13) 46 Bales.
24
184
92
1104 pieces.
42
2208
4416
46368 E.Fl.

then 46368
3
4)139104
answer 34776 yards.

(14) M.fur.yds.
7 1 94
8
57
40
½)2280
5½
11400
1140
94
12634
3
ft.in.b.c. 37902
2 8 2 12
12 454824
32 3
3
98)1364472

98) then 1364472(13923 steps.
98
384
294
904
882
227
196
312
294
remains 18

(15) ft.in.b.c. 12898
17 2 1 = 619 b.c.
116082
12898
77388
B.c. in a M. 190080)7983862(42

then 7983862
760320
380662
380160
502 remain.

(16) Years.
4004
1790
¼)5794
365¼
28970
34764
17382
1448 2/4 = 12 hr.
2116258 12 hr.

then 2116258
24
8465034
4232517
50790204
60
3047412240
60
ans. 182844734400 sec.

(17) Y. qr. na.
2 3 0
1 1 0
1 1 2
5 1 2
4
21
4
86

then 86
× 450
430
344
4)38700
4) 9675
answer 2418yd. 3qrs.

(18) lbs. oz. dwt. gr.
3 5 16 2
12
41
20
836
24
3346
1672
20066

then dwt. gr.
5 7
24
127)20066(158 rings.
127
736
635
1016
1016

THE SINGLE RULE OF THREE.

EXAMPLES.

(2) Stated thus. As 8yd. : 3D. 20c. : : 96yd. : 38D. 40c. For 3,20×96=307,20 which÷8=38,40 answer.

(3) Stated thus: 3D. 20ct. : 8yd. : : 38D. 40ct. : 96yd. For 38,40×8=307,20 which ÷3,20=96yd. answer.

(4) yd. *L.* *s.* yd.	(5) lb. D. ct. lb.
Thus: As $7\frac{7}{8}$: 44 16 : : $\frac{9}{1}$	Thus. As 96 : 9,60 : : 1
1	1
See the note. 8)44 16	96)9,60),10ct. ans.
answer *L.* 5 12*s.*	96
	0

lb. *d.* lbs. *L.* *s.* *d.* *d.* *L.* *s.* *d.*

(6) As 1 : 8 : : 112 : 3 14 8 ans. For 112×8=896=3 14 8

(7) Thus : As 1lb. : 15*d.* : : 112lb. : 7*l.* For 112lb.×15*d.* =1780*d.* and 1780*d.*÷12 and by 20=7*l.* answer.

gal. *d.* gal. qts. *d.* qts. *L.* *s.*

(8) Thus : As 1 : 16 : : 31½ Or, As 4 : 16 : : 126 : 2 2 For 126×16=2016 which ÷4=504*d.* and 504÷12 and by 20=2*l.* 2*s.* answer.

(9) 19×12=228 pair ; then as 228pr. : 136,80ct. : : 1pr. : 60ct. For 136,80÷228=,60cts. answer.

(10) 3C.=336lb. then As 1lb. : 20ct. : : 336lb. : 67D.20ct. For 336×20=67D. 20ct. answer.

(11) Thus : As 1C. : 1*l.* 8*s* : : 33C. 1qr. 22lb. Or, as 112lb. : 28*s.* : : 3746lb. : $932\frac{56}{112}$*s.* For 3746×28= 104888 which÷112=932½*s.* or 46*l.* 12*s.* 6*d.* answer.

(12) 12pcs.×12yd.=144yd, Then as 1yd : 1,40c. : : 144yd. : 201,60ct. For 144×1,40=201D. 60ct. answer.

(13) Thus : As 30 oz. 10dwt. : 9*l.* 2*s.* 6*d.* : : 1 oz. Or, As 730dwt. : 2190*d.* : : 20dwt. : 60*d.* For 2190×20= 43800 which÷730=60*d.* or 5*s.* answer.

(14) Thus : As 1D. : 70ct. : : 1000D. : 700D. For, 1000× ,70=700D. answer.

(15) Thus : As 17C. 3qr. 17lb. : 133*l.* 13*s.* 4*d.* : : 1oz. : 1*d.* or, As 32080 oz. : 32080*d.* : : 1 oz. : 1D. answer.

(16) Thus : As 26*s.* 8*d.* : 1C. : : 23*l.* 10*s.* Or, as 320*d.* : 1C : : 5610*d.* : 17C. 2qr. 14lb. For 5640÷320= $17\frac{20}{32}$C.=17C. 2qr. 14lb. answer.

(17) Thus : As 90lb. : 18*l.* : : 518lb. : 103*l.* 12*s.* For 518 × 18=9324 which ÷90=103*l.* 12*s.* whole cost. And as 90lb. : 18*l.* : : 1*l.* : 4*s.* per lb. answer.
20
36,0÷90=4*s.*

(18) 17T. 12C.=352, then as 352C. : 440D.00 : : 2C. : 2D. 50ct. For 440,00 × 2 = 880,00 which ÷ 352 = 2D. 50ct. answer.

(19) Thus : As 1day : 2D. 40ct. : : 365 : 876D. For 365 ×2,40=876D. answer.

(20) First 546lb.×14 bags,=7644lb. and 48 guin.×35*s.*= 1680*s.* and 1C.=112lb ; then, As 7644lb. : 1680*s.* : : 112lb. : $24s.\frac{4704}{7644}$, For 1680×112=188160 which ÷ 7644=$24\frac{4704}{7044}s.$ or 1*l.* 4*s.* 7*d.*¼+ answer.

(21) 58+62+65½=185½ gal. in 3 casks, then, as 1 gal. : 89c. : : 185½ gal. Or, as 4qts. : 89c. : : 742qts. : 165D. 09ct. 5m. For 742×,89=660,38 which÷4=165D. 9ct. 5m. answer.

(22) 23+24+25+27=99 yards in the 4 pieces. Then, as 1yd. : 72ct. : : 99 : 71D. 28ct. For 99×,72=71D. 28ct. answer.

---

(23) 26½×2+23¾×2=100½ yards, or 402 qrs. Thus : as 4qrs. : 44ct. : : 402 qrs. : 44D. 22ct ; For 402×,44= 176,88 which÷4=44D.22c¼. answer.

(24) 21*s.* 4*d.*=256*d.* then as 1yd : 256*d.* : : 86yd. : 22016*d.* 254*l.* 10*s.*=61080*d.* and 61080*d.*—22016=39064*d.* also, 242—86=156yds. then as 156yds. : 39064*d.* : : 1yd. : 250*d.*½; For 39064 ÷156=250½*d.* Or, 20*s.* 10*d.* ¾qrs. answer.

L. 162 15*s* 4*d.*=39064*d.* Now say, as 156yds. : 39064*d.* : : 1yd. : 250¼*d.* For, 39064÷156=250¼*d.*=20*s.* 10*d.*¼+ per yd. answer.

(25) Thus : As 1yd. : 7*s.* 9*d.*½ : : 53E e. 1qr. Or, as 4qrs. : 374qrs. : : 266qrs. : 24871qrs. For 266×374= 99484 which÷4=24871qrs. or 25*l* 18*s* 1¾*d.* ans.

(26) Thus : As 159*l* 2*s.* : 43C. 2qrs. : : 26*l* 10*s* 4*d.* Or, as 38184*d.* : 178qrs. : : 6364*d.* : 29qrs. For 6364×174qrs. = 1107336 which÷38184=29qrs. or 7C. 1qr. ans.

(27) Thus : As 977*l.* : 420*l.* 6*s* 3*d*¼. : : 1*l.* Or, as 977*l.* : 403501qrs. : : 1*l.* : 413qrs. For 403501÷977=413qrs. =8*s* 7*d.*¼ answer.

(28) Thus : As 1 oz. : 5*s* 9*d*. :: 73lb. 5 oz. 15dwt. Or, as 20dwt. : 69*d*. :: 17635dwt. : 60840*d*.¾ For 17635 × 69 = 1216815 which ÷ 20 = 60840*d*.¾ = 253*l* 10*s* 0*d*.¾ answer.

(29) Thus : As 1C. : 2*l* 6*s* 6*d*. :: 3C. 1qr. 7lb. × 3. Or, as 112lbs. : 558*d*. :: 1113lbs. : 5545*d*.$\frac{14}{112}$ For 1113 × 558 = 621054 which ÷ 112 = 5545⅛*d*. or 23*l* 2*s* 1*d*.⅛ answer.

(30) Thus; As 1*l*. : 3*s* 6*d*. :: 763*l* 15*s*. Or, as 20*s*. : 42*d*. :: 15275*s*. : 32077*d*.½. For 15275 × 42 = 641550 which ÷ 20 = 32077$\frac{10}{20}$*d*. or 133*l* 13*s* 1½*d*. ans.

(31) Thus : As 7*s* 9*d*.½ : 1yd. :: 25*l* 18*s* 1*d*.¾ Or, as 374qrs. : 4qrs. :: 24871qrs. : 266qrs. For 24871 × 4 = 99484 which ÷ 374 = 266qrs. ÷ 5 = 53 E.e. 1qr. ans.

(32) Thus : As 1yd. : 18*s*. 6*d*. :: 1qr. 1na. Or, as 16na. : 222*d*. :: 5na. : 69$\frac{6}{16}$*d*. For 222 × 5 = 1110 which ÷ 16 = 69⅜*d*. or 5*s* 9*d*.⅜ answer.

(33) Thus : As 8*s* 7*d*.¼ : 1*l*. :: 420*l* 6*s* 3*d*.¼ Or, As 413qrs. : 1*l*. :: 403501qrs. : 977*l*. answer.

(34) Thus : As 1 oz. : 6*s* 4*d*. :: 1lb. 7 oz. 14dwt. Or, As 20dwt. : 76*d*. :: 394dwt. : 1497*d*.$\frac{4}{20}$ For 394 × 76 = 29944 which ÷ 20 = 1497⅕*d*. or 6*l* 4*s* 9*d*.⅕ answer.

(35) Thus : As 1C. : 2*l* 19*s* 8*d*. :: 2C. 1qr. 14lb. × 7 casks. Or, as 112lbs. : 716*d*. :: 1862*l*. : 11903½*d*. For 1862 × 716 = 1333192 which ÷ 112 = 11903½*d*. or 49*l* 11*s* 11*d*.½ answer.

(36) Thus : As 1A. : 1*l* 7*s* 8*d*. :: 173A. 2R. 14P. Or, As 160P. : 332*d*. :: 27774P. : 57631*d*.$\frac{8}{160}$. For 27774 × 332 = 9220968 which ÷ 160 = 57631*d*.$\frac{1}{20}$, or 240*l* 2*s* 7*d*.$\frac{1}{20}$ answer.

(37) Thus : As 5yds. : 14*s* 2*d*. :: 21yds. 1qr × 9pcs. Or, as 20qrs : 170*d*. :: 765qrs. : 6502*d*.$\frac{10}{20}$, For 765 × 170 = 130050 which ÷ 20 = 6502½*d*. or 27*l* 1*s* 10½*d*. ans.

(38) First, 3858,24ct—1200D = 2658,24ct. to be expended yearly : Then, as 365days. : 2658,24ct. :: 1day : 7,28 + For 2658,24 ÷ 365 = 7D 28ct. + answer.

(39) Thus : As 1day : 2D 14ct :: 365days : 781,10ct. For 365 × 2,14 = 781D. 10ct. he spends yearly. Then 1333—781,10 = 551D. 90ct. saves yearly.

(40) Thus ; As 7ft. : 4ft. :: 198ft.

4

792 ÷ 7 = 113⅐ feet, answer.

(41) Thus : As 24 hr. : 360 Deg. × 69½ M. : : 1 min. Or, As 1440 min. : 25020 M. : : 1 min. : $17\frac{3}{8}$ M. For 25020÷1440=17M. 3fur. answer.

(42) 53+94+40+27=214ct. will buy 1 lb. of each. Then, as 214ct : 1lb. : : 149800cts. : 700lb. of each. For 149800÷214=700lb. answer.

(43) Thus : As 14lb. 3 oz. 8dwt. : 1371,20ct. : : 1 oz. Or, as 3428dwt. : 1371,20ct. : : 20dwt. : 8D. For 1371,20 × 20=27424 which÷3428=8dols. answer.

(44) 1,66+1,97+2,31=5,94 will pay for 1 ream of each. Then, as 5,94ct. : 1 ream : : 528,66ct. : 89 reams ; For 528,66÷5,94=89 reams of each sort. answer.

(45) Thus : As 9C. 3qrs : 27*l* 17*s* 6*d.* : : 2C. 1qr. 11lb. Or, as 1092lb : 6690*d.* : : 263lbs : 1611*d.*+ For 263 × 6690 = 1759470 which÷1092=1611*d.* + Or, 6*l* 14*s* 3*d.* answer.

(46) Thus : As 1C. : 28*s* 7*d.* : : 59C. 1qr. 14lb. Or, as 112lb. : 343*d.* : : 6650lb. : 20365*d.*$\frac{35}{56}$ For 6650 × 343 =2280950 which÷112=84*l* 17*s* 1*d.*½+ answer.

(47) Thus : As 1A. : 9D. : : 476A. 3R. 28P. Or, as 160P. : 9D. : : 76308P. : 4292D. 32ct. 5m. For 76308 × 9 = 686772 which÷160=4292,32ct. 5m. ans.

INVERSE PROPORTION.

EXAMPLES.

(2) Thus : As 1½yd. : 7½yds. : : 3qrs. Or, as 6qrs. : 30qrs. : : 3qrs. : 60qrs. For 30×6=180 which ÷ 3=60qrs. or 15yds. answer.

(3) Thus : As 12days : 100men : : 3days
12
―――
1200÷3=400 men. answer.

(4) Thus : As 12 in.leng. : 12 in.br. : : 4½ in.leng. Or, as 24half in. : 12 in : : 9half in. : 32 in. For 24 × 12 =288 which÷9=32 in. answer.

(5) Thus : As 1yd : 27ft × 20ft : : 2ft. 6 in Or, as 36 in. : 540ft. : : 30in. : 648ft. For 540 × 36= 19440 which ÷30=648ft÷9=72yds. answer.

(6) Thus : 5qrs : 30yds : : 3qrs.
5
―――
150÷3=50yds. answer.

(7) Thus : As 12m. : 100*l* : : 8m.
— 3 —
3 ——— 2
300÷2=150*l*. answer.

(8) Thus : As 4qrs. : 20yds.×4=80yds : : 5qrs.
4
320÷5=64yds. answer.

(9) Thus : As 24days : 5 men : : 15 days : 8m.
5
120÷ 15 = 8 men. answer.

(10) Thus : As 5 men : 24 days : : 8 men ; 15 days
5
120÷ 8 = 15 days. answer.

(11) Thus : As 4)16hr : 3days : : 4) 12hr. : 4 days.
4 4 3
12÷3=4 days. answer.

(12) Thus : As 6)6 men : 12 days : : 6) 24 men : 3 days
— 1 — answer.
1 — 4
12÷4=3 days. answer.

(13) Thus : As 4P. : 40P. : : 8P. : 20P.
4
160÷8=20 perches. answer.

(14) Thus : As 50,0*l*. : 6m. : : 22,0*l*. : $13\frac{7}{11}$m. For 50 ×6=300 which÷22=$13\frac{14}{22}$ months, or 13m.19d.+ans.

(15) Thus : As 4*s* 6*d*. : 12 oz. : : 3*s*. : 18 oz. Or, as
18)54*d*. : 12 oz. : : 18)36*d*. : 18 oz.
— ×3 —
3 — 2
36÷2=18 oz. answer.

(16) Thus : As 3qr. in : 208lbs : : 39 in.×4qrs = 156qr. in. : 4lb.
× 3
624÷156=4lbs. answer.

(17) Thus : As 2 m. : 800 men : : 5 m.
2
5)1600
Then, 800—320=480 men depart.

(18) Thus : As 4qrs. : 18×30 : : 2qrs.
30
540
4 ft.
2)2160(1080÷9=120yd. ans.

```
(19)   Thus : As 40P. : 4P. : : 13½P.
                  2            2
               ----         ----
                 80           27
                  4  P. yds.ft.in.b.c.
              -----
          27)320(11 4 2 0 2 answer.
             27          then 27)126(4 yds.
            ---                  108
             50                  ---
             27                   18 feet.
           -----                   3 + 1 ft.
           ½)23                 ---
           × 5½              27)55(2 ft.
           ----                 54
            115                 --
          + 11½yd.=1ft.6in,      1
          ------                12 + 6 in.
          27)126(4yds.          --
                                18
                                 3
                               ---
                             27)54(2b.c.
                                54

  (20)              s. d. oz.    s. d.
          Thus : As 6 3 : 9 : : 8 2½
                      12          12
                     ---         ---
                      75          98
                       2           2
                     ---         ---
                     150         197
                       9
                    ----
           197)1350(6 oz.  13 dr. + answer.
               1182         then 197)2628(13dr.
               ----                  197
                168                  ---
                 16                  718
               ----                  591
           197)2688(13 dr.           ---
                            remains  127

  (21)      Thus : As 8,0l. : 15yds. : : 60,0l.
                                8
                         --------
                         6,0)12,0
                         --------
                     answer 2 years.
```

Application.

(1) Thus : As 7s 3d. : 3qrs. : : 13l 15 6d. Or, as 87d. : 3qrs. : : 3306d. : 114qrs. For 3306 × 3 = 9918 which ÷ 87 = 114qrs. or, 28yds. 2qr. answer.

(2) Thus : As 9lbs. 9 oz. 12dwt. : 411l 12s. : : 1gr. Or, as 56448grs. : 98784d. : : 1gr. : 1d.¾ For 98784 ÷ 56448 = 1d.¾ answer.

(3) Thus inversely : As 250*l.* : 7mo. : : 300*l.* : $5\frac{5}{6}$mo. For 250×7=1750 which÷300=$5\frac{25}{30}$mo. or, 5mo. 25*d.* answer.

(4) Thus : As 1day : 19*s* 7*d*=235*d.* : : 365days : 85775*d.* For 365×235=85775*d.* which÷12 and by 20=357*l.* 7*s* 11*d.* Then 500 guin. ×21=10500*s.* which÷20=525*l.* and Lastly 525*l.*—357*l* 7*s* 11*d*=167*l* 12*s* 1*d.* answer.

(5) Thus : As 1yd. : 13*s* 2*d.*½ : : 52E.E. 3qrs. Or, as 4qrs. : 634far. : : 263qrs. 41685 + farthings. For 263 ×634=166742 which ÷ 4=41685 qrs. or 43*l* 8*s* 5*d.*¼ answer.

(6) Thus inversely : As

11days : 30men×4 : : 12days.
4
120×11=1320÷12=110men. answer.

(7) Thus : As 1750*l.* : 32*l* 16*s* 3*d.* : : 1*l.*
20
656
12
7875÷1750=4.*d*½ answer.

(8) First 3 Tons=12 hhds.=756 gals. and 756—85 gals.= 671 gal. remain. Then say, as 671 gal. : 151*l* 14*s.*= 3034*s.* : : 1G. : 4*s* 6*d.*¼ + For 3034 ÷ 671=$4\frac{350}{671}$*s.*= 4*s* 6*d*¼.

(9) Thus inversely : as 5C. 0qr. 14lb. : 96m. : : 3C. 1qr. Or, as 574lbs. : 96m. : : 364lbs. : $151\frac{140}{360}$ miles. For 574×96=55104 which÷364=151M. 3fur. 3P. +ans.

(10) Thus : As 200yds. : 90*l.*—7*l* 10*s.*=82*l* 10*s.* : : 1e.E. Or, as 800qrs. : 1650*s.* : : 5qrs. : $10\frac{5}{16}$*s.* For 1650 ×5=8250 which÷800=$10\frac{250}{800}$*s.* or, 10*s* 3*d.*¾ answer.

(11) Thus inversely : As 512m. : 225C. : : 64m. : 1800C. For 512×225=115200 which÷64=1800C.wt. answer.

(12) First 6*s* 6*d.*÷2=3*s* 3*d.* price per yd. And 3*s* 3*d.*×5 =16*s* 3*d.* value of 5 yds. Then, 18*s* 9*d.*—16*s* 3*d.*= 2*s* 6*d.*=30*d.* gained on 5yds. 180yds. at 3*s* 3*d*=29*l* 5*s.* or 7020*d.* Then lastly as 30*d.* : 5yds : : 7020*d.* : 1170 yds. answer.

(13) Thus : As 6ft. 4in. : 3ft. : : 633ft. 4in. : 300ft. or, As 76 in. : 1yd. : : 7600in : 100yds. For 7600÷76= 100yds. answer.

(14) Thus: As 12yds. : 8yds. : : 24 pcs. × 20yds. = 480 : 320yds. For 480×8=3840 which÷12=320 yds. ans.

(15) First 100*l.*—60*l.*=40*l.* value of the Serge. And as 2yds. Ser. : 3yd. Shal. : : 237yd. Ser. : 355½yd. Shal. Then, yds. *L.* yd.

$$\text{As}\left\{\begin{array}{l} 355\tfrac{1}{2} : 60 :: 1 \\ 237 : 40 :: 1 \end{array}\right\} : 3s\ 4d.\tfrac{1}{2}+\ \text{answer.}$$

(16) Thus: As 1*l* 7*s* 10*d.* : 4E.E. : : 118*l* 17*s* 7*d.*½ Or, as 668 half-pen. : 20qr. : : 57063 half-pen. : 1708qrs. 1na. + Then 2dly, as 33E.Fl. 1qr. 2na. : 1 piece : : 1708qrs. 1na. Or, as 402na. : 1piece : : 6833na. : 16 pieces and 401na. or 33E.Fl. 1qr. 1na. over. answer.

(17) Thus: As 5*s* 6*d.* : 1E.Fl. : : 352*l.* Or, as 66*d.* : 3qrs. : : 84480*d.* : 3840qrs. which÷4=960yds. in all. Again 3840qr. ÷ 5=768E.E. which ÷ 64=12E.E. in each piece. answer.

(18) Thus : As 50ft. 11in. : 98ft. 6in. : : 300ft. 8in. Or, As 611 in. : 1182 in : : 3608 in. : 6979 in. + Again, 20ft, 6in. + 30ft. 9in. = 51ft. 3in. or 615 in. to be deducted ; Then, 6979in.—615in.=6364in. which÷12 & by 3 quotes 176yds. 2ft. 4in. answer.

(19) Thus inversely : As 12in. : 20ft. : : 7½in. Or, as 24 half in. : 20ft. : : 15half in. : 32ft. For 24 × 20=480 which÷15 = 32ft. answer.

(20) First, 20×5=100miles A travels before B sets out ; and 25—20=5 miles B gains upon A in one day's travelling : Then say, as 5 m. : 1day : : 100m. : 20 days. and 20×25=500 miles. answer.

(21) 50—35=15 gallons the cistern retains in one hour : Then say, as 15 gal. : 1 hr. : : 230 gal. : 15hr. 20 min. answer.

(22) min.Cis. min. Cis.

$$\text{As}\left\{\begin{array}{l} 10 : 1 :: 60 : 6 \\ 20 : 1 :: 60 : 3 \\ 40 : 1 :: 60 : 1\tfrac{1}{2} \\ 80 : 1 :: 60 : 0\tfrac{3}{4} \end{array}\right.$$

The 4 cocks in 1 hr. would fill 11¼ cis.

```
              Cis.   min. Cis.  min. sec.
Then  As  11¼ : 60  :: 1  :  5   20  answer.
            4     4     4
         45)  240   4
              225(5min. 20 sec.
               15
               60
              900÷45=20 seconds.
```

(23) Thus : As 365 days. 6 hr. : 596900000m. : : 1 min. Or, as 525960 min : 596900000m. : : 1 min. : 1134 miles. + For 596900000÷525960=1134 miles. ans.

(24) First, 75÷60=1¼ pulsations in one second; Then, as 1¼ pul. : 1142ft. : : 6 pul. Or, As 5 fourths : 1142ft. : : 24 fourths : 5481ft.=1 m. 201 ft. answer.

For 5481÷(5280 the feet in a mile)=1 m. 201ft. ans.

(25) Thus : As 1sec. 1142ft. : : 1min. 3sec. Or, as 1sec. : 1142ft. : : 63sec. : 71946, & 71946÷(5280=the feet in a mile)=13m. 5fur. answer.

DOUBLE RULE OF THREE DIRECT.

EXAMPLES.

(2) By two statings thus : As 4 men : 48 days : : 8 men ; 96 days. Second, as 12days : 96acres : : 16days : 128 acres. answer.

```
Or thus, as 4men  >  acres  <  8men   >  128 acres.
           12 days     48      16days
```

For 48×16×8÷12×4=128 acres answer.

```
                12)ox. acres  12)ox.              16)        16)
(3)  Thus :  As  12  :  20  : :  24 ; Then, as 16  :  40 : : 48
                 —      2        —              —      3      —
                 1      —        2              1      —      3
24 oxen in 16 days eat 40 acres.            answer 120  acres.
```

```
(4)  As 18 horses  >  Bu.  <  60 horses  >  60 Bushels ans.
        20 days       10      36 days.
```

For 60×36×10÷18×20=60 Bushels answer.

```
(5)     7)men   lbs. 7)men       14 days 14 lbs. days  lbs.
Thus :  As 7  :  56   : :  21   Then, as 14  :  168 : : 3 : 36 ans.
           —     3         —             —      —
           1    —          3             1      12
               168                               3
                                                 —
                                                36 lbs. answer.
```

(7) 8)men *s.* 8)men.
Thus : As 8 : 64 : : 48
— 6 —
1 — 6
384
As 4)days *s.* 4)days
Then, as 4 : 384 : : 16
— 4 —
1 —— 4
s. 1536÷20=76*l* 16*s.* answer.

mo. *L.* mo.
(7) Thus : as 7,00*l.* : 14*l.* : : 4,00*l.* Then, as 6 : 8 : : 60=5 years.
4 60
56÷7=8*l.* 480÷6=80*l.* ans.

days acres days acres
(8) 16)men 16)acres men. Then as 7 : 168 : : 19 : 456
Thus : as 16 : 112 : : 24 19
— — 7 —
1 7 — answer 3192÷7=456A.
acres 168

(9) 16)men *L.* *s.* 16)men. Then as 8)da. *L.* *s.* 8)da.
Thus : as 16 : 16 18 : : 32 8 : 33 16 : : 24
— 2 — — 3 —
1 —— 2 1 —— 3
L. 33 16 *L.* 101 8 ans.

L. *s.* *d.*
(10) From 78 7 6
Take 75 0 0
3)mo. —— 3)mo.
Thus : as 9 : 3 7 6 : : 12
— 4 —
3 —— 4
3)13 10 0
L. 4 10
25)*L.* *L.* *s.* 25)*L.* *L.*
Then, as 75 : 4 10 : 100 : 6
— 4 —
3 —— 4
3)18 0
L. 6 per cent. answer.

(11) Thus : 1st, As 6men : 120*l*. :: 14men : 280*l*. Then, 2nd, as 21w. : 280*l*. :: 46w. : 613*l* 6*s*. 8*d*. For 280 ×46=12880 which ÷21=613*l*.$\frac{7}{21}$ or 613*l* 6*s* 8*d*. ans.

(12) Thus : As 100*l*. : 5*l*. :: 259*l* 13*s* 5*d*.
45
100)1298 7 1
Interest for a year, *L*. 12 19 8 $\frac{1}{4}$

2nd 4)w. 4)w.
As 52 : 12*l* 19*s* 8*d*. :: 20
13 5 5
13)64 18 4
L. 4 19 10$\frac{1}{4}$ answer.

(13) Thus ; As 2m. : 12R. :: 8m.
8
2)96
6)days 6)days
Second, as 6 : 48R. :: 24
1 4 4
answer 192 rods.

(14) As 8C. : 6,40cts. :: 4C. 2d, as 128m. : 3,20 :: 32
4 4 1
8)25,60 1
4)3,20
answer 80 cts.

(15) First, as 200lbs :: 40cts. : 20200lb.
40
2,00)8080,00
Dols. 40,40
Second, As. 40m. : 40,40cts. :: 60m.
60
2424,00÷40=60D.60ct. answer.

$\frac{1}{2}$)50C.×2$\frac{1}{2}$
(16) **Thus :** 12C.
As 9
108 : 16*l.* : : 100 + 25
125 × 16
108)2000 (18*l.* 10*s* 4*d.*$\frac{4}{9}$
108
920
864
56×20
108)1120(10*s.*
108
40×12
108)480(4*d.*
432
$\frac{48}{108}$=$\frac{4}{9}$*d.*

20)Leag. *L.* *s.* *d.* 20) Leag.
2ndly, as 20 : 18 10 4$\frac{4}{9}$: : 100
1 5 5
answer *L.* 92 11 10$\frac{2}{9}$

EXAMPLES.

D. days D. m. days m.
(2) 1st. As 4 : 3 : : 40 2nd, As 8 : 30 : : 20 Inversely.
3 8
4)120 2,0)24,0
30 days. ans. 12 days.

8) *s.* men. 8)*s.* days. men. days.
(3) 1st. As 24 : 4 : : 96 2ndly, As 3 : 16 : : 16
3 12 3
4
16)48(3 men ans.
48
3)48
men. 16

(4) Thus : 1st. As 3)15*l.* : 333*l* 6*s* 8*d.* : : 3)6*l.*
5 2 2
5)666 13 4
2ndly, inversely, As 9m. : *L.* 133 6 8 : : 12
9
12) 1200 0 0
answer *L.* 100

(5) Thus : 1st. As, 40cts. : 40m. :: 6060cts. : 6060m.
2nd. Inversely, as 2,00lb. : 6060m. :: 202,00lb. : 60m.
For 6060×2=12120 which÷202=60 miles. answer.

(6) Thus : 1st, As 32×40=1280 : 8 days :: 28×40=1120 : 7days.
2nd, Inversely, as 145men : 7days :: 68men.

$$\begin{array}{r} 7 \\ \hline 1015 \end{array} \div 68 = 14\tfrac{63}{68}\text{da. or, } 14\text{D. } 11\tfrac{2}{17}\text{hr. ans.}$$

(7) Thus : 1st. As 276m. : 16 :: 852 : $49\frac{9}{23}$days For 852×16=13632 which÷276=$49\frac{108}{276}$, or. 49D. 4hr. 41+min.

2nd. Inversely, As 2)14hr. : 49da. 4hr. 41min. :: 2)12hr.

$$\begin{array}{rrrrr} 2)14\text{hr.} & \ 49\text{da.} & 4\text{hr.} & 41\text{min.} & 2)12\text{hr.} \\ \hline 7 & & & 7 & 6 \\ & \multicolumn{3}{r}{\rule{6em}{0.4pt}} & \\ & 6)345 & 8 & 47 & \\ \hline \text{answer} & 57\text{D} & 7\text{hr.} & 27+\text{min.} & \end{array}$$

(8) Thus : First by a double stating Inverse.

As $\left\{\begin{array}{l} 9s.\text{ per bu.} \\ 15\text{ men.} \end{array}\right. > 6\text{ day} < \begin{array}{l} 6s.\text{ per bu.} \\ 30\text{ men.} \end{array} > 4\tfrac{1}{2}\text{ days.}$

For 9×15×6=810 which ÷ 6 × 30=4½ days for 3*s.* worth : Then, 2d. As 3*s.* : 4½days :: 13*s* 4*d.* or, as 36*d.* : 9 half days. :: 160*d.* : 20days. For 160×9=1440 which÷36=40 half days, or, 20 days. answer.

(9) Thus : 1st, Inversely, As 12m. : 100*l.* : 5m. : 240*l.*

$$\begin{array}{r} 100 \\ \hline 1200 \end{array} \div 5 = 240l.$$

2nd. As 8*l.* : 240*l.* :: 8*l.* 12*s.* : 258*l.* answer.

(10) Thus : 1st, As 50)100*l.* : 22w. 6d. :: 50)150*l.*

$$\begin{array}{rrrr} 50)100l. & 22\text{w.} & 6\text{d.} & 50)150l. \\ \hline 2 & & 3 & 3 \\ & \multicolumn{2}{r}{\rule{6em}{0.4pt}} & \\ & 2)68 & 4 & \\ \hline & \text{weeks } 34 & 2 & \end{array}$$

Then 2nd, As 5men : 34w. 2d. :: 12men.
Inversely,

$$\begin{array}{rr} & 5 \\ \hline 12)171 & 3 \\ \hline \text{answer w. } 14 & 2\text{ days.} \end{array}$$

Application.

mo. Bu. mo. Pers. Bu. Pers.
(1) Thus: As 4 : 7 : : 10 Then, as 7 : 17½ : : 46
10 ×17½
4)70 7)805
17½ Bushels. answer 115 Bu.

(2) Thus; As 60)60A. : 36men : : 60)240A.
4
1 4
144 men.
Then, Inversely, as 5days : 144men. : : 12 days
5
12)720
answer 60 men.

(3) Thus : As 3,00Pr. : 5men : : 9,00
9
45 ÷ 3 = 15 men.
Then, Inversely, as 4,0days : 15men : : 6,0days : 10men
4
60 ÷ 6 = 10men answer.

(4) Thus : As 50)150M. : 42*s.* : : 50M.
1
3 1
3)42
14*s.*
Then, as 3C. : 14*s.* : : 7C. 2qrs. 14lb. Or, As
112lbs. : 14*s.* : : 854lbs. : 35*s.* 7*d.* answer.

(5) From 8000 C.wt.
Take 4500
remains 3500 C.wt.
5)C.wt.Hor.5)C.wt.Hor.
Thus, 1st, as 45,00 : 18 : : 35,00 : 14
7
9 7
126 ÷ 9 = 14 horses in 6 days.
2nd. Inverse, as 6days : 14horses : : 3days : 28horses. For
14×6 = 84 which ÷ 3 = 28 horses. answer.

(6) Thus: 1st. As 2,0C. : 5*L*. :: 4,0C.
4
20÷2=10*l*.

Then, 2nd. As 5,0 : 10*L*. :: 10,0
10
100÷5=20*l*. answer.

(7) Thus; 1st. As 1yr. : 576Bu. :: 6yr.
6
3456 Bu.

Then, 2nd. As 48 Bu. : 3456 Bu. :: 240 Bu.
1 5 5
17280 Bushels ans.

(8) Thus: 1st. As 40)80A. : 6days :: 40)200A.
2 5 5
30÷2=15 Dollars.

Then, 2nd. inverse. As 12men : 15days :: 25men : 7⅕days
12
180÷25=7⅕ days. ans.

L. s. d. L. L. s. d. L.
(9) First, 88 17 4—86=2 17 4=Interest of 86 for 8 months. Then, 1st, as 4)8m : 2*l* 17*s* 4*d*. :: 4)12m.
2 3 3
2)8 12 0
L. 4 6 0

2nd. As 86*l*. : 4*l* 6*s*. :: 100*l*. : 5*l*.
10
43 0
10
L.430÷86=5*l*. answer.

PRACTICE.

CASE 1.

EXAMPLES.

```
(2) | ½ | ½   | 6812 at ½
    |   | 12  | 3406
    |   | 2,0 |   28,3  10
    Facit L. 14,3  10
```

```
(3) | ½ | ½   | 4712 at ¾
    | ¼ | ½   | 2356
    |   |     | 1178
    |   | 12  | 3534
    |   | 2,0 |   29,4  6
              Facit L. 14  14  6
```

```
(4) | ¼ | ¼   | 15344 at ¼
    |   | 12  |  3836
    |   | 2,0 |   31,9  8
  Facit L.  15  19  8
```

```
(5) | ½ | ½   | 7672 at ½
    |   | 12  | 3836
    |   | 2,0 | 31,9   8
  Facit L.  15  19  8
```

```
(6) | ½ | ½   | 9424 at ¾
    | ¼ | ½   | 4712
    |   |     | 2356
    |   | 12  | 7068
    |   | 2,0 |  58,9
  Facit L. 29  9
```

CASE 2.

```
(2) | ¼ | ¼   | 8612 at 1¼d.
    |   |     | 2153
    |   | 12  | 10765
    |   | 2,0 |  89,7    1
  Facit L. 44  17  1
```

```
(3) | d. |     |
    | 2  | ⅙   | 1218 at 2½d.
    | ½  | ¼   |  203
    |    |     |   50  9
    |    | 2,0 |  25,3  9
  Facit  L. 12  13  9
```

(4)

d.		
3	¼	7812 at 3¾*d.*
¾	¼	1953
		488 3
	2,0	244,1 3

Facit *L.* 122 1 3

(5)

d.		
4	⅓	8120 at 4*d.*
	2,0	270,6 8

Facit *L.* 135 6 8

(6)

d.		
4	⅓	8121 at 5¼*d.*
1	¼	2707
¼	¼	676 9
		169 2¼
	2,0	355,2 11¼

Facit *L.* 177 12 11¼

(7)

d.		
6½	½	1218 at 6½*d.*
½	$\frac{1}{12}$	609
		50 9
	2,0	65,9 9

Facit *L.* 32 19 9

(8)

d.		
6	½	6120 at 7¾*d.*
1½	¼	3060
¼	⅙	765
		127 6
	2,0	395,2 6

Facit *L.* 197 12 6

(9)

d.		
6	½	7100 at 8*d.*
2	⅓	3550
		1183 4
	2,0	473,3 4

Facit *L.* 236 13 4

(10)

d.		
6	½	4121 at 9¼*d.*
3	½	2060 6
¼	$\frac{1}{12}$	1030 3
		85 10¼
	2,0	317,6 7¼

Facit *L.* 158 16 7¼

(11)

d.		
6	½	1002 at 10½*d.*
3	½	501
1½	½	250 6
		125 3
	2,0	87,6 9

Facit *L.* 43 16 9

(12) | 6 | ½ | 2345 at 11¾*d.*
| 4 | ⅓ | 1172 6
| 1½ | ⅛ | 781 8
| ¼ | ⅙ | 293 1½
48 10¼
| 2,0 | 229,6 1¾
Facit *L.* 114 16 1¾

(13) | 3 | ¼ | 6002 at 4½*d.*
| 1½ | ½ | 1500 6
750 3
| 2,0 | 225,0 9
Facit *L.* 112 10 9

d.
(14) | 6 | ½ | 3001 at 9*d.*
| 3 | ½ | 1500 6
750 3
| 2,0 | 225,0 9
Facit *L.* 112 10 9

d.
(15) | 4 | ⅓ | 7182 at 5*d.*
| 1 | ¼ | 2394
598 6
| 2,0 | 299,2 6
Facit *L.* 149 12 6

(16) | 6 | ½ | 3591 at 10*d.*
| 4 | ⅓ | 1795 6
1197 0
| 2,0 | 299,2 6
Facit *L.* 149 12 6

d.
(17) | 4 | ⅓ | 6128 at 5½*d.*
| 1½ | ⅛ | 2042 8
766 0
| 2,0 | 280,8 8
Facit *L.* 140 8 8

(18) | *d.*
| 6 | ½ | 3064 at 11*d.*
| 4 | ⅓ | 1532
| 1 | ¼ | 1021 4
255 4
| 2,0 | 280,8 8
Facit *L.* 140 8 8

Or thus;
| *d.*
| 1 | $\frac{1}{12}$ | 3064 at 11*d.*
−255 4
| 2,0 | 280,8 8
Facit *L.* 140 8 8

CASE 3.

(2)
d.
1½ | ⅛ | 6100 at 13½
762 6
2,0 | 686,2 6
Facit L. 343 2 6

(3)
d.
2 | ⅙ | 1210 at 14¾d.
201 8
½ | ¼ | 50 5
¼ | ½ | 25 2½
2,0 | 148,7 3½
Facit L. 74 7 3½

(4)
d.
3 | ¼ | 1260 at 15d.
315
2,0 | 157,5
Facit L. 78 15

(5)
d.
3 | ¼ | 7121 at 16¼d.
1 | ⅓ | 1780 3
¼ | ¼ | 593 5
148 4¼
2,0 | 964,3 0¼
Facit L. 482 3 0¼

(6)
4 | ⅓ | 2340 at 17½d.
1½ | ⅜ | 780
292 6
2,0 | 341,2 6
Facit L. 170 12 6

(7)
d.
6 | ½ | 7890 at 18¾
¾ | ⅛ | 3945
493 1½
2,0 | 1232,8 1½
Facit L. 616 8 1½

(8)
6 | ½ | 8900 at 19d.
1 | ⅙ | 4450
741 8
2,0 | 1409,1 8
Facit L. 704 11 8

(9)
6 | ½ | 7120 at 20¼
2 | ⅓ | 3560
¼ | ⅛ | 1186 8
148 4
2,0 | 1201,5 0
Facit L. 600 15 0

(10)
d.
6 | ½ | 2100 at 21½d.
3 | ½ | 1050
½ | ⅙ | 525
87 6
2,0 | 376,2 6
Facit L. 188 2 6

(11)
d.
4 | ⅓ | 6812 at 22¾d.
6 | ½ | 2270 8
¾ | ⅛ | 3406 0
425 9
2,0 | 1291,4 5
Facit L. 645 14 5

(12) | *d.* | |
6 | ½ | 9999 at 23¾*d.*
4 | ⅓ | 4999 6
1 | ¼ | 3333 0
of6*d.* ¾ | ⅛ | 833 3
| | 624 11¼
2,0 | 1978,9 8¼
Facit *L.* 989 9 8¼

(13) | *d.* | |
6 | ½ | 19998 at 23¾*d.*
4 | ⅓ | 9999
1 | ¼ | 6666
of6*d.* ¾ | ⅛ | 1666 6
| | 1249 10½
2,0 | 3957,9 4½*d.*
Facit *L.* 1978 19 4½

(14) | *d.* | |
2 | ⅙ | 12345 at 14*d.*
| | 2057 6
2,0 | 1440,2 6
Facit *L.* 720 2 6

(15) | *d.* | |
4 | ⅓ | 9876 at 17½*d.*
1½ | ⅛ | 3292
| | 1234 6
2,0 | 1440,2 6
Facit *L.* 720 2 6

(16) | *d.* | |
6 | ½ | 7910 at 19½*d.*
1½ | ¼ | 3955
| | 988 9
2,0 | 1285,3 9
Facit *L.* 642 13 9

(17) | *d.* | |
4 | ⅓ | 6780 at 22¾*d.*
6 | ½ | 2260
¾ | ⅛ | 3390
| | 423 9
2,0 | 1285,3 9
Facit *L.* 642 13 9

CASE 4.

(2) | | 121 at 3*s.*
| | 3
2,0 | 36,3
Facit *L.* 18 3

(3) | *s.* | |
5 | ¼ | 471 at 5*s.*
Facit *L.* 117 15

(4) 191 at 8*s.*
4 4
Fac. *L.* 76 8

(5) 242 at 11*s.*
11
2,0)266,2
Facit *L.* 133 2

(6) 600 at 13*s.*
13
2,0)780,0
Facit *L.* 390

(7) 171 at 16*s.*
8 8
Fac. *L.* 136 16

(8) 2,0)100 at 19*s.*
—5
Facit *L.* 95

(9) 612 at 9*s.*
9
2,0)550,8
Facit *L.* 275 8

(10) 306 at 18*s.*
9 9

Facit *L.* 275 8

(11) 860 at 7*s.*
7
2,0)602,0
Facit *L.* 301 0

(12) 430 at 14*s.*
7 7
Facit *L.* 301 0

CASE 5.

(2) *s. d.* |2|6|$\frac{1}{8}$|569 at 2 6 *s. d.*
Facit *L.* 71 2 6

(3) *s. d.* |3|4|$\frac{1}{6}$|69 at 3 4 *s. d.*
Facit *L.* 11 10

(4) |*s.* 6 |*d.* 8 |$\frac{1}{3}$|478 at 6 8 *s. d.*
Facit *L.* 159 6 8

(5) |*s.* 10 |*d.* | |$\frac{1}{2}$|400 at 13 4 *s. d.*
| 3| 4|$\frac{1}{3}$|200
66 13 4
Facit *L.* 266 13 4

(6) |*s.* 10| |$\frac{1}{2}$|789 at 16 8 *s. d.*
| 6| 8|$\frac{1}{2}$|394 10
263 0
Facit *L.* 657 10

(7) |*s.* 5|*d.* | |$\frac{1}{4}$|765 at 5 9 *s. d.*
| | 6|$\frac{1}{10}$|191 5
| | 3|$\frac{1}{2}$| 19 2 6
9 11 3
Facit *L.* 219 18 9

(8) |*d.* 2 |$\frac{1}{6}$|841 at 13 2 *s. d.*
13
10933
140 2
2,0)1107,3 2
Facit *L.* 553 13 2

(9) |*d.* 4 |$\frac{1}{3}$| 807 at 16 5 *s. d.*
16
12912
| 1 |$\frac{1}{4}$| 269
67 3
2,0)1324,8 3
Facit *L.* 662 8 3

(10) |*d.* 1 |$\frac{1}{12}$|969 at 19 11 *s. d.*
2,0) 8,0 9
deduct 4 0 9 price at 1 *d.*
Facit *L.* 964 19 3

(11) | *s.* | *d.* |
5 | | ¼ | 244 at 5 8½
| 6 | 1/16 | 61
| 2 | ⅓ | 6 2
| ½ | ¼ | 2 0 8
0 10 2
Facit *L.* 69 12 10

(12) | *d.* | |
4 | ⅓ | 875 at 1*s.* 4¾*d.*
½ | ⅛ | 291 8
¼ | ½ | 36 5½
18 2¾
2,0)122,1 4¼
Facit *L.* 61 1 4¼

(13) | 4*d* | ⅓ | 7524 at 3*s* 5½*d.*
3
1½ | ⅛ | 22572
2508
940 6
2,0|2602,0 6
Facit *L.* 1301 0 6

(14) | 3*d* | ¼ | 3715 at 9*s* 4*d.*½
9
33435
1½ | ½ | 928 9
464 4½
2,0|3482,8 1½
Facit *L.* 1741 8 1½

(15) | 6*d* | ½ | 2572 at 13*s* 7½*d.*
13
33436
1½ | ¼ | 1286
321 6
2,0|3504,3 6
Facit *L.* 1752 3 6

(16) | 6*d* | ½ | 5144 at 6*s* 9¾*d.*
6
30864
3 | ½ | 2572
¾ | ¼ | 1286
321 6
2,0|3504,3 6
Facit *L.* 1752 3 6

(17) | ½ | ½ | 4567 at 19*s* 11*d.*½
12|2283½
2,0| 19,0 3⅓
deduct 9 10 3½ price at ½
Facit *L.* 4557 9 8½

(18) | 4 | ⅓ | 9134 at 9 11¾
9
6 | ½ | 82206
3044 8
1½ | ¼ | 4567 0
¾ | ⅙ | 1141 9
190 3½
2,0|9114,9 8½
Facit *L.* 4557 9 8½

CASE 6.

(2) 26×11 at 11*l* 14*s*.
7 — 7
18 4
286 0
Facit 304 4

(3) 36×5 at 5*l* 13*s*.
13
2,0)46,8
23 8
180 0=36×5*l*.
Facit *L*. 203 8

(4) *s*. *d*. | 3 | 4 | $\frac{1}{6}$ | *l*. *s*. *d*. 47 at 3 3 4
3
141
+ 7 16 8
Facit *L*. 148 16 8

(5) | 6 | 8 | $\frac{1}{3}$ | *l*. *s*. *d*. 156 at 3 6 8
3
468
52
Facit *L*. 520

(6) *s*. *d*. | 10 | | $\frac{1}{2}$ | *l*. *s*. *d*. 78 at 6 13 4
6
468
| 3 | 4 | $\frac{1}{3}$ | 39
13
Facit *L*. 520

(7) *s*. *d*. | 10 | 0 | $\frac{1}{2}$ | *l*. *s*. *d*. 457 at 14 17 9½
14
| 6 | 8 | $\frac{1}{3}$ | 6398
| 1 | | $\frac{1}{10}$ | 228 10
152 6 8
| | 1½ | $\frac{1}{8}$ | 22 17 0
2 17 1½
Facit *L*. 6804 10 9½

(8) *d*. | 4 | $\frac{1}{3}$ | *l*. *s*. *d*. 914 at 7 8 10¾
148 20
| 6 | $\frac{1}{2}$ | 7312 148
12796
304 8
| ¾ | $\frac{1}{8}$ | 457 0
57 1½
2,0 | 13609,0 9½
Facit *L*. 6804 10 9½

(9) *L*. *s*. *d*. 500 at 12 19 11½
10
By compound mul. 129 19 7
10
1299 15 10
5
Facit *L*. 6498 19 2

L. s. d.
(10) 1000 at 6 9 11¾
10
64 19 9½
10
649 17 11
10
Facit L. 6498 19 2

CASE 7.

C. qr. lb. L. s. d.
(2) 12 2 14 at 3 14 0
12
qr. lb.
2 | ½ | 44 8 0
14 | ¼ | 1 17 0
0 9 3
Facit L. 46 14 3

C. qr. lb. L. s. d.
(3) 37 2 14 at 7 10 9×1
4×9+1=37
30 3 0
9
qr. lb. 271 7 0
2 | ½ | 7 10 9
278 17 9½
14 | ¼ | 3 15 4½
0 18 10
Facit L. 283 11 11½

C.qr.lb. L. s. d.
(4) 9 2 26 at 4 10 4½
qr. lb. 9
of 1c.wt. 2 | ½ | 40 13 4½
16 | 1/7 | 2 5 2¼
8 | ½ | 0 12 10¾
2 | ¼ | 0 6 5¼
0 1 7¼
Facit L. 43 19 6

C. qr.lb. L. s. d.
(5) 5 2 10 at 2 18 6½
qr. lb. 5
of 2 qr. 2 | ½ | 14 12 8½
8 | 1/7 | 1 9 3¼
2 | ¼ | 0 4 2
0 1 0½
Facit L. 16 7 2¼

(6) 59C. 1qr. 14lb. at 1 8 7d.×3
qr. lb. 7×8+3
1 | ¼ | 10 0 1
8
80 0 8
4 5 9
14 | ½ | 0 7 1¾
0 3 6¾
Facit L. 84 17 1½

C. qr. lb. *L.* *s.* *d.*
(7) 72 3 27 at 8 11 5
qr. lb. 9×8=72
2 ½ 77 2 9
8
1 ½ 617 2 0
of 1c.wt. 16 ⅐ 4 5 8½
8 ½ 2 2 10¼
2 ¼ 1 4 5¾
1 ½ 0 12 2¾
0 3 0½~
0 1 6¼
Facit *L.* 625 11 10

qr. lb. *L.* *s.* *d.*
(8) 2 14 at 3 7 6
qr. lb.
2 ½ 1 13 9
of 2qr. 14 ¼ 0 8 5¼
Facit *L.* 2 2 2¼

(9) lbs. *L.* *s.* *d.*
24 at 4 17 0
lbs.
16 ⅐ 0 13 10¼
8 ½ 0 6 11
Facit *L* 1 0 9½

(10) lb. *L.* *s.* *d.*
17 at 3 5 4
lb.
14 ⅛ 0 8 2
2 ⅐ 0 1 2
1 ½ 0 0 7
Facit *L.* 0 9 11

lb. oz. *s.* *d.*
(11) 27 10 at 1 4
oz. 3
6 ½ 4 0
9
1 16 0
4 ⅓ 0 0 8
0 0 5¼
Facit *L.* 1 17 1¼

lb. oz. dwt. gr. *L.* *s.* *d.*
(12) 13 10 12 8 at 4 7 6×1
oz. dwt. gr. 12+1=13
6 ½ 52 10 0
4 ⅓ 4 7 6
of 4 oz. 2 3 9
10 ⅛ 1 9 2
of 2dwt. 2 ⅕ 0 3 7¾
8 ⅙ 0 0 8¾
0 0 1¼+
Facit *L.* 60 14 10¾

of 1oz. | 5 | | ¼ | 3 16 8
1 | | ⅕ | 0 19 2
| 12 | ½ | 0 3 10
| 4 | ⅓ | 0 1 11
0 0 7½

Facit *L.* 66 8 10½

yds.qr. *s.* *d.*
14) 67 2 at 12 2×1
6×11+1

qr. 2 | ½ | 3 13 0
11

40 3 0
0 12 2
6 1

Facit *L.* 41 1 3

yds.qr. *s.* *d.*
(15) 68 1 at 8 1×
6×

qr. 1 | ¼ | 2 8 6
11

26 13 6
0 16 2
2 0¼

Facit *L.* 27 11 8¼

(16) yds. qr. *s.* *d.*
419 3 at 12 6

s. *d.*
10 | | ½ | 209 10
2 | 6 | ¼ | 52 7 6
9 4½

qr.
2 | ½ | 6 3
1 | ½ | 3 1½

```
        A. R. P.   L.  s. d.
(18)    476 3 28 at 3  7 11×6
                         10
     R. P.          ----------
    |  |   |  |  33  19   2×7
    |  |   |  |            10
    |  |   |  |  ------------
    |2 |   |½ | 339  11   8
    |  |   |  |           4
    |  |   |  |  ------------
    |  |   |  |1358   6   8
    |  |   |  | 237  14   2
    |  |   |  |  20   7   6
    |1 |   |½ |   1  13  11½
    |  |20 |½ |   0  16  11¾ of 1 acre
of 1 R. |  8 |⅕ |   0   8   5¾
    |  |   |  |   0   3   4¾
              ----------------
      Facit L. 1619  11   1¾
```

```
        A. R. P.   L.  s.  d.
(19)    953 3 16 at 1 13  11½×3
                          10
     R. P.          ----------
    |  |  |   16  19   7×5
    |  |  |             10
    |  |  |  -------------
   2|  | ½|  169  15  10
    |  |  |             9
    |  |  |  -------------
    |  |  | 1528   2   6
    |  |  |   84  17  11
    |  |  |    5   1  10½
   1|  | ½|    0  16  11¾
    |16|⅒|         8   5¾
    |  |  |         3   4¾
          ----------------
  Facit L. 1619  11   1¾
          ----------------
```

Application.

```
(1) | | |  yds.
    |¼|¼|18848 at ¾
     —  4712
    12)14136
  2,0) 117,8
Facit L. 58 18
```

```
(2) d.      lbs.    d.
  |1½|  ⅛|6789 at 1¾
  |  |   |----------
  | ¼|  ⅙| 848   7½
  |  |   | 141   5¼
      2,0) 99,0  0¾
  Facit L. 49 10  0¾
```

```
(3)   d.   gal.
    | 6|½|3906 at 7½d.
    |  | |-----
    |1½|¼|1953
    |  | | 488   3
     2,0)244,1   3
Facit L. 122  1  3
```

```
(4)  d.     oz.
   |1½|⅛|2004 at 10½d.
        —250   6
   2,0)175,3   6
Facit L. 87 13  6
```

```
(5)   d.  yds.        s. d.
    |3|¼|12240 at 1  3½
    |½|⅙| 3060
    | | |  510
        |------
     2,0|1581,0
Facit L. 790  10
```

```
(6)          d.   lb.       s. d.
            |6|½|1234  at 1  11¾
            |4|⅓| 617
            | |¼| 411   4
     of 6 a |¾|⅛| 102  10
            | | |  77   1½
                 ----------
              2,0\244,2  3½
       Facit L. 122  2  3½
```

(7) *s.* gal. *s.*
| 4 | ⅕ | 987 at 4
Facit *L.* 197 8

(8) gal. *s.*
543 at 11
11
2,0)597,3
Facit 298,13

(9) *s.* *d.* bu. *s.* *d.*
| 6 | 8 | ⅓ | 138 at 6 8
Facit *L.* 46

(10) *s.* bu. *s.* *d.*
| 10 | | ½ | 800 at 13 4
| 3 | 4 | ⅓ | 400
133 6 8
Facit *L.* 533 6 8

(11) *s.* *d.* bu. *s.* *d.*
| 2 | 6 | ⅛ | 875 at 2 9½
| | 3 | ⅒ | 109 7 6
| | ½ | ⅙ | 10 18 9
1 16 5½
Facit *L.* 122 2 8½

(12) *s.* *d.* Tons *L.* *s.* *d.*
| 6 | 8 | ⅓ | 94 at 6 6 8
6
564
31 6 8
Facit *L.* 595 6 8

(13) *s.* *d.* T. *L.* *s.* *d.*
| 10 | | ½ | 156 at 13 16 8
13
| 6 | 8 | ⅓ | 2028
78
52
Facit *L.* 2158

(14) T. *L.* *s.* *d.*
2000 at 6 9 11¾
10
By comp. mul. 64 19 9½
10
649 17 11
10
6498 19 2
2
Facit *L.* 12997 18 4

(15) 4000 Tons at 12*l* 19*s* 11½*d.*
Say 4000 at 13*l.* = 52000*l.*
4000 at ½ = 8 6 8 Subtract.

Facit *L.* 51991 13 4

(16) C.qr. lb. *L.* *s.* *d.*
8 1 16 at 5 17 9
qr.lb. 8
| 1 | | ¼ | 47 2 0
of 1cwt. | | 16 | ⅐ | 1 9 5¼
0 16 9¾
Facit *L.* 49 8 3

(17) C. qr. lb. *l.* *s.* *d.*
16 2 17 at 2 15 11
4×4

qr.
2 | ½ | 11 3 8
4

44 14 8
of 1 C.wt. | 16 | $\frac{1}{7}$ | 1 7 11½
1 | $\frac{1}{16}$ | 0 7 11¾
0 0 5¾+

Facit *L.* 46 11 1

(18) C. qr. lb. *l.* *s.* *d.*
144 2 21 at 3 17 6
12×12=144

qr. lb.
2 | ½ | 46 10 0
12

558 0 0
of 2 qr. | 4 | ¼ | 1 18 9
7 | ½ | 0 9 8¼
0 4 10

Facit *L.* 560 13 3¼

(19) dwt. gr.
2,0)50 20 *s.* *d.*
oz. 2 10 20 at 17 6 per oz.
dwt. gr. 2

of 10 dwt. | 10 | 20 | ½ | 1 15 0
$\frac{1}{12}$ | 8 9
0 8¾

Facit *L.* 2 4 5¾

(20) 9T. 19C. 3qr. 27¾lb. at 39*l* 19*s* 11½*d.*

L. *s.* *d.*
Say 10T. at 40*l*=400 0 0
Then 10 half pence.= 0 0 5
and for the ¼lb. = 0 0 1 0qr.$\frac{2558}{8960}$
From 400*l.* subtract 0 0 6 0qr.$\frac{2558}{8960}$
answer. *L.* 399 19 5 ¾ $\frac{6452}{8960}$

L. s. d.

Say 20T. at 20*l.* = 400 0 0

Then 20 farthings = 0 0 5

and ½lb. = 0 0 1 0qr.$\frac{1279}{4480}$

From 400*l.* take 0 0 6 0qr.$\frac{1279}{4480}$

answer *L.* 399 19 5 3qr.$\frac{3201}{4480}$

Or by the Rule of Three Direct.

hus ; As, 1T. : 19*l* 19*s* 11¾*d.* : : 19T. 19C. 3qr.
Or, as 4480 half lb. : 19199qrs. : : 89599 half lb. : 3
qrs.$\frac{3201}{4480}$; For 89599 × 19199 = 1720211201 wh
4480 = 383975$\frac{3201}{4480}$qrs. or, 399*l* 19*s* 5*d.* 3qr. + an

C. qr. lb. *L.* *s.* *d.*

2) 289 1 14 at 1 18 9

d.		38*s.*
6	½	
		2312
		867
3	½	144 6
		72 3
		14 6¼ for 1qr. 14lb.

qr.	lb.		
1		¼	0 9 8¼
	14	½	0 4 10
			s. 14 6¼

2,0)1121,3 3¼

Facit *L.* 560 13 3¼

T. C. *L.* *s.* *d.*

oz. dwt. gr. *L.* *s.* *d.*
(24) 420 15 16 at 3 16 10½
10
38 8 9×2
10
dwt. gr.
|10| ½| 384 7 6
4
of 5dwt. 1637 10 0
76 17 6
|5| ½| 1 18 5¼
|12| $\frac{1}{10}$| 0 19 2½
|4| ⅓| 0 1 11
0 0 7½
Facit *L.* 1617 7 8¼

(25) yds. qr. *s.* *d.*
1157 2 at 29 4½
29
d. 10413 |2qr.| ½|14 8¼
|3 |¼|2314
|1½|⅛| 289 3
144 7½
14 8¼=for 2 qrs.
2,0)3400,1 6¾
Facit *L.* 1700 1 6¾

(26) A. R. *s.* *d.*
1157 2 at 117 6
117 R.
|2 | ½| 58 9
d. 8099
|6 |½| 12727
578 6
58 9=for 2 roods.
2,0)13600,6 3
Facit *l.* 6800 6 3

(27) gal. qt. *s.* *d.*
7caskseach 84 1 at 11 3
d. 7 qt.
|3 |¼|589 3 |2|½| 5 7½
11 |1|½| 2 9¾
6479 *s.* 8 5¼
147 3
8 5¼ for 3 qts.
2,0)663,4 8¼
Facit *l.* 331 14 8¼

(28) yds, qr. *s.* *d.*
139 3 at 39 4
39 qr.
|2|$\frac{1}{2}$|19 8
|4 |$\frac{1}{3}$|1251 |1|$\frac{1}{2}$| 9 10
417 *s.* 29 6
46 4
29 6 for 3 qrs.
2,0)549,6 10
Fac. *l.* 274 16 10

(29) yds. qr. *l.* *s.* *d.*
279 2 at 3 18 8
78 20
qr.
|6|$\frac{1}{2}$| 2232 |2|$\frac{1}{2}$ 78 8
|2|$\frac{1}{3}$|1953
139 6 *s.* 39 4
46 6
39 4 for 2 qrs.
2,0)2198,7 4
Facit *l.* 1099 7 4

(30) qr. na. *s.* *d.*
3 2 at 17 6 per yd.
qr.
|2| |$\frac{1}{2}$| 8 9
|1| |$\frac{1}{2}$| 4 $4\frac{1}{2}$
| |2|$\frac{1}{2}$| 2 $2\frac{1}{4}$
Facit *s.* 15 $3\frac{3}{4}$

(31) oz. *L.* *s.* *d.*
12 at 3 10 0 per lb.
oz.
|8|$\frac{1}{2}$| 1 15
|4|$\frac{1}{2}$| 0 17 6
Facit *l.* 2 12 6

TARE AND TRETT.

CASE 1.

EXAMPLES.

(2) C. qr. lb.
456 1 19 gross.
— 15 2 13 tare.
L. *s.* *d.*
440 3 6 neat 1 15 8
10
17 16 8×4
10
qr. lb.
| 2| |$\frac{1}{2}$| 178 6 8
4
713 6 8
71 6 8
| 1| |$\frac{1}{2}$| 0 17 10
of 1 qr. | | 4|$\frac{1}{7}$| 0 8 11
| | 2|$\frac{1}{2}$| 0 1 $3\frac{1}{4}$
0 0 $7\frac{1}{2}$
Amount *L.* 786 1 $11\frac{3}{4}$

```
(3)                  C. qr. lb.
    lbs.             201  3  12
    3140÷112=         28  0   4
                     ----------     L.  s.  d.
    C.wt. neat=      173  3   8 at  1  17   6×3
                                            10
                                   -------------
                                   18  15   0×7
                                            10
                                   -------------
                        qr. lb.    187  10   0
                       |2 |  | ½|131    5   0
                       |  |  |  |  5   12   6
             of 2 qr.  |1 |  | ½|  0   18   9
                       |  |8 | ⅐|  0    9   4½
                       |  |  |  |  0    2   8+
                                   -------------
                       Amount l.  325  18   3½

(4)     C.qr.lb.              lb.          C.qr.lb.                lb.
No.  1=4  2  14 gr. tare 21         No. 4=6  1  16gr. tare 27
     2=3  0  17          18             5=3  2  18             19
     3=3  4  10          39               --------             --
       ----------        --               10  0   6gross 1  18 ta.
        13  2  13gross 2 22             —0  1  18 tare
      — 0  2  22 tare                    --------      L.  s.  d.
        ----------                   neat wt. 9  2  16 at 2  17   6
neat wt. 12  3  19 at l. 2   4   7                                9
                            12                    qr. lb.   ----------
                   ------------                 |2|   | ½|25  17   6
         qr. lb.    26  15   0           of 1C. | |16 | ⅐| 1   8   9
        |2 |   | ½|  1   2   3½                 | |   |  | 0   8   2½
        |1 |   | ½|  0  11   1¾              C. qr. lb.   ----------
        |  |14 | ½|  0   5   6¾              9  2  16cost27  14   5½
of 1 qr.|  | 4 | ⅐|      1   7              12  3  19=   28  15  11¾
        |  | 1 | ¼|      0   4¾            ------------------------
                   ------------ neat. 22  2   7 val. 56  10   5¼
Value of 3 first L. 28  15  11¾
```

CASE 2.

```
(2)   317×70=22190lbs. gross.
       61×70= 1120 tare.
      lbs. neat 21070 at 12s 6d.
      s. d.     -----
      |10|  | ½| 10535
      | 2| 6| ¼|  2633  15
                -----------
      amount L. 13168  15
```

(3) C. qr. lb.
86 2 14 gross.
16×100÷112=14 1 4 tare.
L. *s.* *d.*
neat weight C. 72 1 10 at 3 15 10
9
34 2 6
8
qr. lb.
| 1 | | ¼ | 273 0 0
0 18 11½
of 1 C.wt. | | 8 | ¼ | 0 5 5
| | 2 | ¼ | 0 1 4¼
Facit *L.* 274 5 8¾

(4) C. qr. lb.
18 2=2072 gross
lb. 37×4= 148 tare
lbs. neat 1924 at 4*s* 6*d.* per lb.
s. *d.*
| 4 | | ⅕ | 384 16
| | 6 | ⅛ | 48 2
Value *l.* 432 18

CASE 3.

EXAMPLES.

(2) C. qr. lb. lb.
lb. 75 3 14 gross ; tare 14 per C.
| 14 | ⅛ | 9 1 26 tare
C. 66 1 16 neat at 18*s* 6*d.*
6×11
5 11 0
11
qr. lb.
| 1 | | ¼ | 61 1 0
of 1 C.wt. | | 16 | 1/7 | 0 4 7½
0 2 7½+
Facit *l.* 61 8 3

(3) C.qr. lb. C. qr. lb.
6 2 12×9=59 1 24 gross.
lb. C. qr. lb.
16 | 1/7 | 59 1 24 gross; tare per C. 17lb.
1 | 1/16 | 8 1 27
0 2 3
—9 0 2
L. s. d.
C. 50 1 22 neat at 2 12 6
10
26 5 0
5
qr. lb.
1 | 1/4 | 131 5 0
14 | ½ | 0 13 1½
7 | ½ | 0 6 6¾
1 | 1/7 | 0 3 3¼
0 0 5½+
Facit L. 132 8 5+

(4) C. qr. lb lb.
lb. 43 3 21 gross, tare 12 per C.
8 | 1/14 | 3 0 15 8
4 | ½ | 1 2 7 12
—4 2 23 4 tare.
L. s. d.
C. 39 0 25 12 neat, at 2 15 4×1
4×10—1=39
11 1 4
10
lb. oz.
6 | 1/7 | 110 13 4
— 2 15 4
8 | ½ | 107 18 0
1 | ⅛ | 0 7 10¾
8 | ½ | 0 3 11¼
4 | ½ | 0 0 5¾
0 0 2¾
0 0 1¼
Value L. 108 10 7¾

```
          28                                       ______
         ____                                    925 lb. ne
          280                                 d.____
          72                               |6|1/2|462   6
         ____.                             |2|1/3|154   2
         1000 gross                        |1/2|1/4| 38   6½
                                                 ________
                                             2,0)65,5  2½
                                     amount l. 32  15  2
                                                 ________
(3)         C. qr. lb.                            then 2
           120  2   0 gross                              1
176lb.=      1  2   8 tare                          ______
       ________________                             21  16
       26)118   3  20 suttle             lb.qr.
        —   4   2   8 trett                          ______
       ________________                  |1| | |1/4|240   3
       C. 114   1  12 N. at 2l. 3 8      | | | |   |  8  14
                                         | |8|1/14||  0  10
                                         | |4|1/2|  |  0   3
                                         | | | |   |  0   1
                                                    ______
                                     amount L.     249  13
                                                          L
(4)  lb.      C. qr. lb.                                  3
   |8|1/14| 177  0 22 gross
          ____________                                  ___
   |1|1/8|   12  2 17                                   37
              1  2  9                       qr. lb.     __
```

SIMPLE INTEREST.

CASE 1.

EXAMPLES.

(2) *L.* *s.* *d.*
87 14 5 at 6*l.*
6
5,26 6 6
20
5,26
12 *L.* *s.* *d.*
ans. 5 5 3
3,18

(3) *L.* *s.* *d.*
173 17 8½ at 7*l.*
7
12,17 3 11½
20 *L.* *s.* *d.*
3,43 173 17 8½ Prin.
12 12 3 5¼ Int.
5,27 *L.* 186 1 1¾ amo.
4
1,10

(4) *L.* *s.* *d.*
176 13 9 at 5*l.*
L.
| 5 | 1/20 | 8 16 8¼ = Int. for 1 year.
9
79 10 2¼ do. for 9 yr.
176 13 9 Principal.
L. 256 3 11¼ = amount.

CASE 2.

EXAMPLES.

(2) *L.* *L.* *s.* *d.*
| 5 | 1/20 | 427 18 9 at 5¾*l.*
| ½ | 1/10 | 21 7 11¼
| ¼ | ½ | 2 2 9½
1 1 4¾
24 12 1½
2
Facit *L.* 49 4 3

(3) *L.* *L.* *s.* *d.*
| 5 | 1/20 | 1096 15 6 at 6½*l.*
| 1 | 1/5 | 54 16 9¼
| ½ | ½ | 10 19 4¼
1 | 5 9 8
Int. for 1 yr. = *L.* 71 5 9½
4
do. for 4yr. = 285 3 2 } +
Principal 1096 15 6 }
amount *L.* 1381 18 8 ans.

CASE 4.

EXAMPLES.

```
(2)     C. qr. lb.              then 1000 gross
         8   3 20                    —38 tare
         4                           ————
       ————                      26)962 suttle
        35                           —37 trett
        28                           ————
       ————                          925 lb. neat at 8½d.
       280                        d.————
        72                     |6|½|462   6
       ————                    |2|⅓|154   2
      1000 gross               |½|¼| 38   6½
                                   ————————
                                 2,0)65,5  2½
                          amount l. 32 15  2½
                                   ————————

(3)          C. qr. lb.                 then 2   3   8×4
            120  2   0 gross                     10
176lb.=       1  2   8 tare                  ————————
        26)118   3  20 suttle                21 16   8
          —   4  2   8 trett           lb.qr.        11
       C. 114    1  12 N. at 2l. 3 8   |1| | ¼|240   3   4
                                       |  |  |    8 14   8
                                       | |8|1/14| 0 10  11
                                       | |4| ½|   0  3  1¼
                                       | | |   |  0  1  6½
                                amount L.   249 13  6¾
(4)  lb.   C. qr. lb.                           L. s. d.
    |8|1/14| 177  0 22 gross                     3 14  0×6
    |  |   |————————                                  10
    |1| ⅛ |   12  2 17                          ————————
              1   2  9                          37  0  0×5
            ————————                    qr. lb.        10
          —  14   0 26 tare             |2| | ½|370  0  0
            ————————                    | | |  |185  0  0
        26)162    3 24 suttle           | | |  | 22  4  0
          —   6   1  2 trett            | |14|¼|  1 17  0
            ————————                    | | 7|½|  0  9  3
         C. 156   2 22 neat at,         | | 1|⅐|  0  4  7½
                                        | |  |  |  0  0  7¾
                                     amount L. 579 15  6¼
```

SIMPLE INTEREST.

CASE 1.

EXAMPLES.

(2)

	L.	*s.*	*d.*
	87	14	5 at 6*l.*
			6
	5,26	6	6
	20		
	5,26		
	12		
	3,18		

	L.	*s.*	*d.*
ans.	5	5	3

(3)

	L.	*s.*	*d.*
	173	17	8½ at 7*l.*
			7
	12,17	3	11½
	20		
	3,43		
	12		
	5,27		
	4		
	1,10		

	L.	*s.*	*d.*	
	173	17	8½	Prin.
	12	3	5¼	Int.
L.	186	1	1¾	amo.

(4)

L.		*L.*	*s.*	*d.*	
		176	13	9 at 5*l.*	
5	$\frac{1}{20}$	8	16	8¼	=Int. for 1 year.
				9	
		79	10	2¼	do. for 9 yr.
		176	13	9	Principal.
	L.	256	3	11¼	=amount.

CASE 2.

EXAMPLES.

(2)

L.		*L.*	*s.*	*d.*
5	$\frac{1}{20}$	427	18	9 at 5¾*l.*
½	$\frac{1}{10}$	21	7	11¼
¼	½	2	2	9½
		1	1	4¾
		24	12	1½
				2
Facit *L.*		49	4	3

(3)

L.		*L.*	*s.*	*d.*	
5	$\frac{1}{20}$	1096	15	6 at 6½*l.*	
1	$\frac{1}{5}$	54	16	9¼	
½	½	10	19	4¼	
		5	9	8	
Int. for 1 yr.=*L.*		71	5	9½	
				4	
do. for 4yr. =		285	3	2	} +
Principal		1096	15	6	} +
amount *L.*		1381	18	8	ans.

CASE 3.

EXAMPLES.

(2) *L.*

| 5 | $\frac{1}{20}$ | 57 17 8 for 3 mo. at 6*l*.

| 1 | $\frac{1}{5}$ | 2 17 $10\frac{1}{2}$

0 11 $6\frac{3}{4}$

| mo.

| 3 | $\frac{1}{4}$ | 3 9 $5\frac{1}{4}$ Int. for a yr.

answer. *L.* 0 17 $4\frac{1}{4}$ do. for 3 mo.

(3) *L.* *L.* *s.* *d.*

| 5 | $\frac{1}{20}$ | 150 19 0 for $3\frac{1}{3}$ yr. at 6*l*.

| 1 | $\frac{1}{5}$ | 7 10 $11\frac{1}{4}$

1 10 $2\frac{1}{4}$

| mo.

| 4 | $\frac{1}{3}$ | 9 1 $1\frac{1}{2}$ Int. for 1 yr.

3

27 3 $4\frac{1}{2}$ do. for 3 yr.

3 0 $4\frac{1}{2}$ do. for 4 mo.

answer *L.* 30 3 9 do. for $3\frac{1}{3}$ yr.

(4) *L.* *s.*

$\frac{1}{2}$)126 12 for 16 weeks at $4\frac{1}{2}$*L.*

4

506 8

63 6

L. 5|69 14

20

s. 13|94

12

d. 11|28

4

qr. 1|12

w. *L.* *s.* *d.* w.

Then, as 52 : 5 13 $11\frac{1}{4}$ :: 16 Or, as 52w. : 5469qrs. :: 16w. : 1682qrs. For 5469×16=87504 which ÷52 =1682qrs. or 1*l* 15*s* 0*d*$\frac{1}{2}$.

(5)

		L.	*s.*		
½	½	243	17		for 146 days at 5¾*l.*
			5		
		1219	5		
¼	½	121	18	6	
		60	19	3	
	L.	14|02	2	9	
		20			

0|42 &c. *L.* 14 0 5 Int. for 1yr.

Then, As 365days : 14*l* 0*s* 5*d.* : : 146 days, Or, as 365 days : 3365*d.* :: 146days : 1346*d.* For 3365 × 146 = 491290 which ÷ 365 = 1346*d.* or, 5*l* 12*s* 2*d.* And 243*l* 17*s.* Prin. + 5*l* 12*s* 2*d.* Int. = 249*l* 9*s* 2*d.* amount answer.

(6)

	L.			*L.*	*s.*	*d.*	
	5		$\frac{1}{20}$	71	3	11½	for 1 yr. 5mo. & 25da. at 6*l.*
	1		⅕	3	11	2¼	
				0	14	3¾	
	mo.						
	4		⅓	4	5	5	Interest for 1 year.
	1		¼	1	8	5½	do. for 4 mo.
		15	½	0	7	1¼	do. for 1 mo.
of 1 mo.		10	⅓	0	3	6½	do. for 15 days.
				0	2	4¼	do. for 10 do.
answer *L.*				6	6	10½	do. for 1yr. 5mo. 25days.

(7) *L.* *s.* *d.*

116 17 2 for 6 years, 7 mo. & 19da. at 7*l.* per cent.

	L.	*s.*	*d.*
	116	17	2
			7
L.	8|18	0	2
	20		
s.	3|60		
	12		
d.	7|22		

	mo.	day.		*L.*	*s.*	*d.*	
	6		½	8	3	7	Int. for 1 year.
						6	
				49	1	6	do. for 6 yr.
	1		⅙	4	1	9½	do. for 6 mo.
				0	13	7½	do. for 1 mo.
As 365da. : 8*l* 3*s* 7*d.* : : 19da. =					8	6	do. for 19days.
				54	5	5	Interest.
				116	17	2	Principal.
answer *L.*				171	2	7	amount.

```
   (9)         mo. days.
            2) 71   28
           ------------
     ½time=35½  14
           L.   s.  d.
     ½) 674  13   8¾
                  5×7=35
     ------------------
       3373   8   7¾
                  7.
 d.  ------------------
|10|⅓|2361|4  0   6¼   22 )
|  | |  33|7  6  10¼    4 }+
| 2|⅓|  22|4 17  10¾    4 )        L.   s.   d.
|  | |   4|4 19   6¾   —          242  13   2¾
|  | |   4|4 19   6¾   30÷3=               10 deduct.
     ----------------             -------------
  L. 242|66   4   4¾   Inter.=    242  12   4¾
           20          Prin. =    674  13   8¾
      -------                     -------------
      s. 13|24          amount L. 917   6   1½
           12
      -------
      d. 2|92
            4
      -------
    qrs. 3|71
```

```
 (10)       571 dols.            (11)     325 dols.
             30 days.                      64 days.
        ----------                       ------
      6,0)1551,0                          1300
        ----------                        1950
      dols. 2,58½                    6,0)2080,0
                                      dols. 3,46+
```

```
(12)          31        3da.|1/10|L. 100×3
            — 5             |    |-----
July          26        1   |  ⅓ |    30|0
August        31                       1|0
Sept.         30                       3   6   8
Octo.         31                   ---------------
Novm.         30                  L. 3|13   6   8
Decem.        31                        20
January        9                  s. 2|66
          --------                      12
          3,0)18,8                d. 8|00
          2) 6  8                  L.  s.  d.
          --------                 3   2   8
   mo. 3  4=½time.   31÷3=         —  10⅓
                                   -----------
                     answer. L. 3   1   9⅔
```

(13) 2)12 mo. 60)135 days.

6mo. 2¼ mo.

Then ¼)240*l.*×2¼

6

144|0

48|0

6|0

L. 19|80

20

19 16 0

54÷3= 1 6 subtract.

1*L.*=$\frac{1}{6}$)19 14 6 Interest at 6 per cent.

3 5 9 do. at 1 do.

answer *L.* 23 0 3 do. at 7 per cent.

(14) ½)12mo. 213days.

6 3,0)106½

3 16½

days.

|15| ½| *L.* 371×3

6

222|6

111|3

|1½|$\frac{1}{10}$| 18|5 10

1|8 11

L. 35|43 1

then *L.* 35|43 1

20

s. 8|61

12

d. 7|32

4

qr. 1|28

L. *s.* *d.*

35 8 7¼

130÷3= 0 3 7¼subtract.

answer *L.* 35 5 0

(15) ½)12mo. 73days.

mo. da.

mo. 6 36½÷30=1 6½

L. *s.* *d.*

325 15 6×1

6

days. 195 4 13 0

| 6| $\frac{1}{3}$| 32|5 15 6

| ½|$\frac{1}{12}$| 6|5 3 1

|5 8 7

L. 23|51 0 2

then 23|51 0 2

20

s. 10|20

12

d. 2|42

4

qr. 1|68

L. *s.* *d.*

23 10 2¼

38÷3= 0 1 0½ deduct

1*l.*=$\frac{1}{6}$)23 9 1¾ at 6 per cent.

3 18 2¼ at 1 do.

answer *L.* 27 7 4 Int. at 7 per.

```
(16) mo.       L.   s.   d.
 ½)11   ½)  148  12   6½
   5½                  5½
           743   2    8½
            74   6    3¼
      L. 8|17    8   11¾
            20
        s. 3|48
            12
        d. 5|87
             4
       qr. 3|51
 answer L. 8  3  5¾ Interest.

            yr. days.
(18) From   18   0
     Take   15 219
           ---------- mo.  da.
             2 146 = 24   146
and 2)  24 146
        -------       mo. da.
        12   73÷30 =  2   13
               L.    s.
Then multi.   651   11×2
       by            12
   days     ------------
  10 | ⅓ | 781 8    12
     |   | 130|3     2
   3 | ⅒ |  21|7     3   8
     |   |   6|5     3   1
         L. 94|04    0   9

(19) mo. da.       L.    s.    d.
 2)71    25    ½)517   12    8½
   35½   12½                 5
              2588     3    6½
 days.                       7
 |10| ⅓ |1811|7     4    9½
 |  |   |  25|8    16    4¼
 |2½| ¼ |  17|2    10   10¾
 |  |   |   4|3     2    8½
       L. 185|91   14    9
```

```
(17) mo.        L.   s.   d.
 ½)17    ½)333  13   3¾
   8½                8½
          2669   6   6
           166  16   7¾
      L. 28|36   3   1¾
             20
         s. 7|23
             12
         d. 2|77
              4
        qr. 3|11
          333  13  3¾ Princip.
           28   7  2¾ Interest.
answer L. 362   0  6½ amount.
   then L. 94|04  0  9
              20
          s. 0|80
              12
          d. 9|69
               4
         qr. 2|76
            L.  s.  d.
            94  0  9½
157÷3 =      0  4  4¼ sub.
   1l. = ⅙)93  16  5¼ Int. at 6l.
           15  12  8¾ do. at 1l.
          109   9  2  do. at 7l.
          651  11  0  Principal.
answer l. 761   0  2  amount.
   then L. 185|91  14  9
                20
           s. 18|34
                12
              4|17
                 4
               |68
      l.  s.  d.    —
     185  18  4
21÷3 =         7 deduct.
ans.  l. 185  17  9
```

(20) 5794×7÷100÷4÷12 answer 8*s.* 5¼*d.*

```
(21)  L.      mo.                        L.      mo.
    ½)60  for 7÷2=3½                 ½)150 for 15÷2=7½
         3½                                7½    l.  s.   mo.
      ----                             -----  ½)75  10 for 9÷2=4½
       180                              1050         4½
        30                                75     ---------
   L. 2|10                             -----     302   0
        20                           l. 11|25     37  15
     -----                                 20    -------
    s. 2|00                            -----l. 3|39  15
    -------                                        20
      l.  s.    mo.
     145  15 for 27÷2=13½.        s. 5|00     -------
          12+1½=13½                ------
  1½|⅛|1749   0                               s. 7|95
       218  12  6                                  12
   l. 19|67  12  6                               -----
        20                                    d. 11|40
   s. 13|52                                         4
        12                                      -----
   d. 6|30                                   qr. 1|60
        4
   qr. 1|20
      L.  s.     mo.
|¾|½| 397  12 for 45½÷2=22¾
| | |        2
| | |----------
| | | 795 · 4
| | |      11
| | |----------
| | |8747   4
|¼|⅛| 198  16
       99   8
  ------------
 L. 90|45   8
        20
   s. 9|08
        12
   d. 0|96
         4
  qrs. 3|84
```

L.	Collectively.	*L.*	*s.*	*d.*
60	× 3½ =	2	2	0
150	× 7½ =	11	5	0
75 10	× 4½ =	3	7	11¼
145 15	× 13¼ =	19	13	6¼
397 12	× 22¾ =	90	9	0¾
828 17	prin. *L.*	126	17	6¼ + whole Int.
		828	17	0 Prin.
	answer *L.*	955	14	6¼ + amount.

INSURANCE COMMISSION, &c.

CASE 4.

EXAMPLES.

(2) *L.* *s.* *d.*
7406 17 6 at $15\frac{3}{4}$ per cent.
12
|3|$\frac{1}{4}$|88882 10 0
|$\frac{3}{4}$|$\frac{1}{4}$|22220 12 6
5555 3 $1\frac{1}{2}$
L. 1166|58 5 $7\frac{1}{2}$
20
s. 11|65
12 *L.* *s.* *d.*
answer 1166 11 $7\frac{3}{4}$
d. 7|87
4
qr. 3|50

(3) *L.* *s.* *d.*
|$\frac{2}{4}$|$\frac{1}{2}$|704 15 4 at $1\frac{3}{4}$*l.*
|$\frac{1}{4}$|$\frac{1}{2}$|352 7 8
176 3 10
L. 12|33 6 10
20
s. 6|66
12
d. 8|02
L. *s.* *d.*
answer 12 6 8

(4) *L.* *s.* *d.*
L. 7|00 14 6 at 4*s.* per ct.
20
s. 0|14
12
d. 1|74
4
qrs. 2|96
s. *L.*
|4|$\frac{1}{5}$| 7 0 $1\frac{1}{2}$ at 1*l.* per. ct.
L. 1 8 $0\frac{1}{4}$ answer.

(5) *L.* *s.* *d.* *s.* *d.*
|5 |$\frac{1}{4}$|420 12 6 at 6 4 per ct.
|1 |$\frac{1}{5}$|105 3 $1\frac{1}{2}$
|4d|$\frac{1}{3}$| 21 0 $7\frac{1}{2}$
7 0 $2\frac{1}{2}$
L. 1|33 3 $11\frac{1}{2}$
20
s. 6|63
12
ans. 1*l.* 6*s.* $7\frac{1}{2}$*d.*
d. 7|67
4
qrs. 2|70

(6) 85600 dol. × 35 = 2996000 which ÷ 100 = 29960 dol. ans.

CASE 5.

EXAMPLES.

(2) *L.* *s.*
½)4 10 per cent. per ann.
9½
40 10
2 5
42 15
100 0
L. 142 15 amount of 100*l.* for 9½ years.

L. *s.* *L.* *L.* *s.*
Then, as 142 15 : 100 : : 856 10 Or, as 2855*s.* : 100*l.* : : 17130*s.* : 600*l.* For 17130×100=1713000, which ÷2855=600*l.* answer.

CASE 6.

(2) 856dol. 50ct.—600dol.=256dol. 50ct. whole Interest. Then, as 600dol. : 256dol. 50ct. : : 100dol. : 42dol. 75ct. for 9½years. Then, as 9½yrs. : 42dol. 75ct. : : 1 yr. : 4dol. 50ct. per cent. answer.

CASE 7.

(2) ½)600 at 4½
4
2400
300
L. 27|00

L. *s.*
From 856 10
Take 600 0 yr. mo.
27)256 10(9 6
243
13
12+6 for 10
162
162
ans. 9yr. 6m.

(3) 2000
× 5
dols. 100,00

From 2925 amount.
Take 2000 principal,
925 whole Interest.

Then, as 100dols. : 1yr. : : 925dols. : 9¼yr. or 9 yr. 3 mo.
Lastly, 21yr—9yr. 3mo.=11yr. 9mo. answer.

COMPOUND INTEREST.

(2) *L.* *s.* *d.*
5l. | 1/20 | 400 0 0
1 | 1/5 | 20 0 0
4 0 0

.5 | 1/20 | 424 0 0 amt. 1 yr.
1 | 1/5 | 21 4 0
4 4 9½

.5 | 1/20 | 449 8 9½ amt. 2 yrs.
1 | 1/5 | 22 9 5¼
4 9 10½

5 | 1/20 | 476 8 1¼ amt. 3 yrs.
1 | 1/5 | 23 16 4¾
4 15 3¼

ans. 504 19 9¼ amt. 4 yrs.

(4) *L.*
¼)500 at 4¼ per cent.
4
2000
125
L. 21|25
20
s. 5|00
L. *s.*
500 0
21 5
¼) 521 5 = amount 1 year.
4¼
2085 0
130 6 3
L. 22|15 6 3
20
s. 3|06
12
d. 0|75
4
qrs. 3|00

(3) dols.
5 = 1/20)1280 Principal.
+ 64
1/20)1344
67,2
1/20)1411,20
70,56
1/20)1481,76
74,08,8
1/20)1555,84,8
77,79,2+
1/20)1633,64,0
81,68,2
From 1715,32,2 amount.
Take 1280,00,0 Principal.
answer 435,32,2 comp. Int.

L. *s.* *d.*
521 5 0
22 3 0¾
¼)543 8 0¾ amount 2 yr.
4¼
2173 12 3
135 17 0
L. 23|09 9 3
20
s. 1|89
12
d. 10|71
4
qrs. 2|84

L. *s.* *d.*
543 8 0¾
23 1 10½
¼)566 9 11¼ amount 3 yr.
4¼
2265 19 9
141 12 5¾
L. 24|07 12 2¾ continued

(4) continued, *L.* 24|07 12 $2\frac{3}{4}$
20
s. 1|52
12
d. 6|26
4
qrs. 1|04

L. *s.* *d.*
566 9 $11\frac{1}{4}$
24 1 $6\frac{1}{4}$
ans. 590 11 $5\frac{1}{2}$ amt. for 4yr.

(5) *L.* *s.*
$\frac{1}{2}$)400 10 at $3\frac{1}{2}$ per cent.
$3\frac{1}{2}$
1201 10
200 5
L. 14|01 15
20
s. 0|35
12
d. 4|20

L. *s.* *d.*
400 10 0
14 0 4
$\frac{1}{2}$)414 10 4 amt. 1 year.
$3\frac{1}{2}$
1243 11 0
207 5 2
L. 14|50 16 2
20
s. 10|16
12
d. 1|94
4
qrs. 3|76

L. *s.* *d.*
414 10 4
14 10 $1\frac{3}{4}$
$\frac{1}{4}$)429 0 $5\frac{3}{4}$ amt. 2 yrs.
$3\frac{1}{2}$
1287 1 $5\frac{1}{4}$
214 10 $2\frac{3}{4}$
L. 15|01 11 8
20
s. 0|31
12
d. 3|80
4
qrs. 3|20

L. *s.* *d.*
429 0 $5\frac{3}{4}$
15 0 $3\frac{3}{4}$
444 0 $9\frac{1}{2}$ amt. 3 yr.
—400 10 0 Principal.
ans. *l.* 43 10 $9\frac{1}{2}$ com. Int.

REBATE OR DISCOUNT.

EXAMPLES.

(2) mo. D. c. m.
6|½|5 00 0 Then, as 107dols. 91ct. 6m.: 100 : :
1|⅙|2 50 0 430dols. 67ct. : 399dols. 07ct.+
41 6 For 430,67 × 100 = 43067,00
7 91 6 which ÷ 107,916 = 399 dols. 07 ct.
100 present worth.
amount 107 91 6

(3) mo. *L.* *s.* *d.* Then, as 101*l* 3*s*. 4*d*. : 100*l*. : : 795*l*.
4|⅓| 3 10 0 11*s*. 2*d*. Or, as 24280*d*. : 100*l*.
: : 190934 : 786*l* 7*s* 8*d*. For
1 3 4 190934×100=19093400which
100 0 0 ÷24280=786*l* 7*s* 8*d*. answer.
L. 101 3 4

L. *s*. *d*.
(4) 6|½|7 0 0 for 12 mo.
2|⅓|3 10 0 Then, as 111*l* 13*s* 4*d*. : 100*l*. : : 112*l* 12*s*.
1 3 4 Or, as 26800*d*. : 100*l*. : : 27024*d*.
100 0 0 : 100*l* 16*s* 8½*d*. For 27024×100
=2702400 which ÷ 26800=100*l*.
L. 111 13 4 16*s* 8½*d*. Lastly, 112*l* 12*s*.—100*l*.
16*s* 8½*d*.=11*l* 15*s* 3½*d*. Rebate. ans.

(5) mo. D.ct. ½)832
3=¼)5 00 D.cts.
1 25 As 101,25 : 100 : : 416 :
100 100
101 25 101,25)41600

The present worth of 416dols.=410 86 4 for 3mo.

mo. D. c. D. c. D. D.
6 =½) 5 00 Then, as 102,50 : 100 : : 416
100
2 50
100 102,50)41600
amt. 102 50to the pres.worth of416d.=405 85 3 for 6mo.
add 410 86 4 for 3mo.
D. D. cts. m. 816 71 7 pr. wor.
Lastly 832—816 71 7=15 28 3 the answer.

$\frac{1}{2}$)100

(6) mo. *L.* *s.* *d.* *L.* *s.* *d.* *L.*

4| $\frac{1}{3}$| 5 0 0 then, as 101 13 4 : 100 : : 50

3+2 3

1 13 4

100 305 305)150 00

L. 101 13 4 Pres. worth of 50*l.* for 4mo.=*l.*49 3 7$\frac{1}{4}$

mo. *l.* *s.* *d.* *l.* *s.* *d.* *l.* *l.*

again |4|$\frac{1}{3}$|5 0 0 then, as 103 6 8 : 100 : : 50|

—1 13 4 3+1 3

3 6 8 310 310)150 00

100

Pres. worth of 50*l.* for 8mo. *l.* 48 7 8$\frac{3}{4}$

103 6 8

Lastly *49l 3s 7$\frac{1}{4}$d.*+*48l 7s 8$\frac{3}{4}$d.*=*97l* 11*s* 4*d.* ans.

(7) 1st. 5×12=60, &.60+100=160 the amount.

2nd, As 160dols. : 60dols. : : 500dols. : 187dols. 50ct.

Rebate. 3d. 100D. D. 500D. D.

1 yr. > 5 < 12 y. > 300 Interest.

4th. 300—187,50=112,50 in favour of the Interest.

EQUATION.

EXAMPLES.

(2) 50×2= 100
100×5= 500
150×8= 1200

3,00)18,00

answer=6 months.

(3) 400× 5=2000
400×10=4000

1,000)6,000

answer =6 months.

(4) Suppose 20*l.* then,

20÷4= { 5×2=10
5×4=20
5×6=30
5×8=40

2,0)10,0

answer 5 mo.

(5) *L.* *L.* *L.*
1st. 240—40=200, Then,
Inver. as 240*l.* : 5mo. : : 200*l.* : 6mo.
5

12,00÷2,00=6mo. answer.

(6) *L.* *L.* *L.*
1st. 420—60=360, Then,
Inversely, as 420*l.* : 6mo. : : 360*l.* : 7mo.
6
252,0÷36,0=7mo. answer.

BARTER.

EXAMPLES.

lbs. *s.* lb. *s.* lbs.
(2) 1C.wt.=112 at 4*s.* per. Then, as 10 : 1 : : 448 : 44⅘
4| ⅕| *l.* 22 8=448*s.* answer 44lb. 12oz. 12⅘drs.

(3) 3½C.wt.=392lbs. at 5*d.* *s.* C. *d.*
5 2nd. As 28 : 1 : : 1960
12
1960*d.* C. qr. lb.
336)1960(5 3 9⅓. answer.

(4) As 20cts. : 25cts. : : 200cts.
200
2,0)500,0
Dols. 2,50 ans.

s. *d.* *s.* *d.*
(5) As 8 6 : 10 : : 18
12 18
s. *d.*
102) 180(1 9+ans.
102
78
12
936
918
remains 18

(6) cts. cts. cts.
As 100 : 106 : : 10
10
100)1060
answer 100 6m.

(7) C. *s.* *s.*
41×30=1230
L. 20×20= 400 deduct.
d. lb.
As 5 : 1 : : 830*s.*
12
5)9960
answer 1992 lbs.

(8) 320 doz.
×1,20
384,00—160=224dols. to be laid out for cotton.
Then as 20cts. : 1lb. : : 22400cts. : 1120lb. answer.

(9) 75 sheep at 14 6
174 12
3*s*. 6*d*.=42*d*. 300 174
1275
13050*d*.
17*l*. 12*s*.=4224 deduct.
As 42*d*. : 1bu. : : 8826 : 210bu. 4qts.
For 8826÷42=$210\frac{6}{42}$bu.=210bu. 4qts.+answer.

(10) C.
5
5
5
5
560lbs. at 6*d*.
6
3360 *d*.
Then as 10*s* 8*d*.=128*d*. : 1lb. : : 3360*d*. : 26lb. 4oz.
For 3360÷128=$26\frac{1}{4}$lb. or, 26lb. 4oz. answer.

(11) 63 gals.=1 hhd.
3
s. *d*. *s*. *d*.
6 8=$\frac{1}{3}$)189 gals. at 6 8
63*l*.
20
126)1260(10*s*. answer.
126
0

(12) *s*. *s*. *d*. *d*.
1st. As 12 : 13 : : 18 : $19\frac{1}{2}$
For 18×13=234÷12=$19\frac{1}{2}$ in barter.
2nd. As 18*d*. : 1lb. : : 1200*s*. : 800lbs.
12
18)14400(800lbs. answer.
144
00

(13). *d.* *d.* *d.*
1st. As. 10 : 12 :: 7½ Or.
half pen. *d.* half pen. *d.*
as 20 : 12 :: 15 : 9 in barter.
| 6*d.* | ½ | 3610 at 7½*d.*
| 1½ | ¼ | 1805
451 3
2256 3
35*l.*×20= 700 0 deduct.
2nd, As 10*d.* : 1ell. 1556 3
12
1,0)1867,5
1867½ Ells answer.

(14) *s.* C. *s.* *d.*
| 1 | $\frac{1}{20}$ | 20 at 21 6
| *d.* | | 1
| 6 | ½ | 0 10
L. 21 10 Value of A's
L. *s.*
8 pieces at 3 14
8
From *L.* 29 12 Value of B's
Take 21 10
A receives *L.* 8 2 answer.

(15) C. qr. *L.* *s.*
5 1 at 1 18
qr. 5
| 1 | ¼ | 9 10
0 9 6
Val. of Tobac. *l.*9 19 6

yds. *L.* *s.* *d.* yd.
Then, as 24 : 9 19 6 :: 1 Or, as 24yds. : 2394*d.* :: 1yd. : 99 $\frac{18}{24}$*d.* For 2394÷24=99¾*d.* or 8*s.* 3*d.*¾ answer.

(16) yds. *s.* *d.*
40 at 7 4
5×8=40
1 16 8
8
Value of the cloth L. 14 13 4

continued.

Then, 28$\frac{1}{2}$lbs. at 11 6
4×7=28

$\frac{1}{2}$) 2 6 0
7

16 2 0
5 9

From 16 7 9 Value of the Tea,
Take 14 13 4

A pays *L.* 1 14 5 answer.

(17) 7$\frac{1}{2}$ C.wt.=840lbs. at 8*d.*
8

Then, as 12$\frac{1}{2}$C. : 6720*d.* : : 1lb. Or, as 1400lbs. : 6720*d.* : : 1lb. : 4$\frac{3}{4}$*d.*+ For 6720÷1400=4$\frac{112}{140}$*d.* or 4$\frac{3}{4}$*d.*+ answer.

(18) 20 C.wt. at 3*l.* Then, as 8*d.* : 1lb. : : 60*l.* Or, as 8*d.* : 1lb. : : 14400*d.* : 1792lbs. or 16C. 8lb. answer.
3

L. 60

(19) *s.* *d.*
From 12 6
Take 10 0

s. 2 6

Then, as *s.* 2 *d.* 6 : *s.* 10 : : *d.* 10 Or, as 30*d.* : 10*s.* : : 10*d.* : 3*s.* 4*d.* answer.

(20) 1st. As 2*l* 16*s.* : 3*l.* : : 5*s.* : 5*s.* 4$\frac{2}{7}$*d.*
20 20

56 60×5=300 which÷56=5$\frac{5}{14}$ *s.* or 5 *s.* 4$\frac{2}{7}$ *d.*

2nd. 12$\frac{1}{2}$C.wt.×3*l.*=37*l.* 10*s.* Val. of the Hops in Barter.

3d. As Gal. 1 : *s.* 5 *d.* 4$\frac{2}{7}$: : Gal. 63
7

1 17 6
9

L. 16 17 6

4th. From *L.* 37 *s.* 10 *d.* 0
Take 16 17 6

answer. *L.* 20 12 6

LOSS AND GAIN.

(2) 120×12=1440 & 20—17=3cts. loss on one knife. Then say, as 1kni. : 3cts : : 1440kni. : 43,20cts. ans.

(3) 4*s* 9*d*—4*s*.=9*d*. gain on 4 shillings.
Then, as 4*s*. : 9*d*. :: 100*l*. : 4500*d*. or 18*l*. 15*s*. ans.

(4) 1st. 17*L*.×7T.×4hhds.=476*l*. Prime cost of the wine.
2nd. 7T.×4hhds.×63 gals.×8pt=14112 pts. in 7 Tons.
3d. 1411,2 ÷2,0=705*l* 12*s*. and 705*l* 12*s*.—476*l*.=229*l*. 12*s*. whole gain. 4th As 476*l*. : 229*l* 12*s*. :: 100*l*. : 48*l* 4*s* 8¼*d*.+gain per cent.

(5) 149+51=200 dols. to be given for 100 yards. Then, as 100yd. : 200dols. :: 1yd. : 2dols. answer.

(6) 60×2=120 dols. Then, as 100 dols. : 4dol. :: 120 dols. : 4dol. 80ct. answer.

(7) First, 100*l*.—9*l*.=91*l*. and 500 knives ×15*d*.=7500*d*.
2nd. as 91*l*. : 100*l*. :: 7500*d*. : 8241¾*d*.
×100
750000÷91=8241¾*d*.

3d. From 8241¾ *d*.
Take 7500
Remains 741¾*d*. which÷12 and by 20=3 *L*. 1 *s*. 9¾ *d*. ans.

(8) First, 69*l*. ×14T.=966*l*. The first cost. 14T.×20C.×4qr.×28lb.=31360lbs.
2nd. 6d. | ½ | 31360lbs. at 6*d*.
2,0)1568,0
l. 784 sold for.

3d. From 966*l*. bought for,
Take 784 sold for.
answer. *l*. 182 loss.

(9) First 16*s*.—13*s* 4*d*.=2*s* 8*d*. gain per yard. Then, as 13*s* 4*d*. : 2*s* 8*d*. :: 100*l*. or, as 160*d*. : 32*d*. :: 100*l*. : 20*l*. For 32×100=3200 which÷160=20*l*. answer.

(10) 1C.wt.=112lb. at 11*d*. per lb.
11
1232
L. *s*. *d*. 4 13 4=1120*d*. subt.
112*d*. gain.

Then, as 4*l*. 13*s* 4*d*. : 112*d*. :: 100*l*. Or, as 1120*d*. : 112*d*. :: 100*l*. : 10*l*. For 112×100=1120,0 which÷112,0=10*l*. answer.

(11) 100+15=115 *L*. Then, as 100 *L*. : 115 *L*. :: 56 *L*. : 64*l* 8*s*.
56
690
575
6440÷100=64*l* 8*s*.

2nd, as 100 yds. : 64 *L*. 8 *s*. :: 1 yd.
20
1,00)12,88
answer $12\frac{88}{100}$*s*. or, 12*s* 10½*d*.+

(12) *L. s.*
12)5 14
0 9 6*d.*

L. L. s. d.
Then, as 108 : 100 :: 9 6 Or, as 108*l.* : 100*l.* :: 114*d.* : $105\frac{1}{2}$*d.*+ For 114×100=11400 which ÷108*l.* =$105\frac{65}{108}$*d.* or 8*s* $9\frac{1}{2}$*d.*+ answer.

(13) *L. L. L.* — *L. s. d.*
Thus, 25–18=7 then, 18*l.* 4m. > 7*l.* < 100*l.* 12m. > 116 13 4 ans.

L. m. *L.* *L.* m. — *L.* *s.* 6
For 100×12×7÷18×4=$116\frac{2}{3}$*l.* or 116 13 4 answer.

(14) d.
2 | $\frac{1}{6}$ | 300 lbs at 4*s* 2*d.*
4
1200
+50
2,0)125,0
L. 62. 10

Then, as 104*l.* : 100*l.* :: 75*l.* : $72\frac{12}{104}$*l.* For 75×100=7500 ÷104=72*l* 2*s* $3\frac{1}{2}$*d.* pres. worth And 72*l* 2*s* $3\frac{1}{2}$*d*—62*l* 10*s.*=9*l* 12*s.* 3*d*$\frac{1}{2}$. whole gain.

| 5 | $\frac{1}{4}$ | 300lbs. at 5*s.*
L. 75 0
—62 10
L. 12 10

L. s.
Again, As { 62 10 / mo. 8 } > *L. s.* 12 10 < 100*l.* 12 > *L.* 30
500

$\frac{1}{2}$)1200
× $12\frac{1}{2}$*l.*
14400
+ 600
5,00)150,00
L. 30 per cent.

m.
| 6 | $\frac{1}{2}$ | 6*l.* per cent. for a year.
| 2 | $\frac{1}{2}$ |
3
1
4
+100
l. 104

L. s. d.
answer 9 12 $3\frac{1}{2}$ whole gain, and 30*l.* per ct.

(15) Thus, as 7*s.* : 110*l.* :: 8*s* 6*d.* Or, as 84*d.* : 110*l.* :: 102*d.* : $133\frac{4}{7}$*l.* For 102×110=11220 which ÷84= $133\frac{4}{7}$*l.* or 133*l* 11*s* $5\frac{1}{7}$*d.* Then, 133*l* 11*s* $5\frac{1}{7}$*d.*—100*l.* =33*l* 11*s* $5\frac{1}{7}$*d.* gained, answer.

(16) 370D. 10ct.—326dols.=44D. 10ct. gained on 490lbs.
Then as, 490lb. : 44D. 10ct. : : 1lb. : ,09ct. answer.

(17)
L. *s.* *d.*
Thus. 6 10 0
+1 0 10
L. *L.* *L.* *s.*
Then, as 10,0 : 12,0 : : 7 10 10=Prime cost : 9 1 ans.
12
10)90 10 0
L. 9 1 0 answer.

(18) Thus, From 28 at 4*l.*=112*l.*
+ { 10 at 6*l.*= 60
8 at 5*l.*= 40
Take 18 =*L.* 100 Value of 18 pieces.
10 pieces.
Then, as 10,0*l.* : 11,0*l.* : : 112*l.*
11
1,0)123,2
From 123 4
Take 100 0
Value of the 10 rem. pieces =*l.* 23 4

Lastly, as 10pes. : 23*l* 4*s* : : 1pes. : 2*l* 6*s* $4\frac{4}{5}$*d.*

(19) Thus, as 115*l.* : 100*l.* : : 11*s* 6*d.* Or, as 115*l.* : 100*l.* : : 138*d.* : 120*d.*=10*s.*
s. *s.* *d.* *s.* *d.* *l.* *s.*
From 12 &11 6 Then, as 1 6 : 15*l,* : : 2
Take 10 –10 2 4 2
s. 2 1*s* 6*d.* 3 3)60 4
answer =20*l.* per cent.

(20)
Thus, as 7*s.* : 110*l.* : : 6*s.* Then, From 100 0 0 (*l.* *s.* *d.*)
6 Take 94 5 $8\frac{4}{7}$
7)660 answer *l.* 5 14 $3\frac{3}{7}$ loss.
l. 94 5 $8\frac{4}{7}$

(21) 100*l.* at $1\frac{1}{2}$*d.* in the shilling.
20
$1\frac{1}{2}$| $\frac{1}{8}$| 2000
2,0) 25,0
answer *L.*12 10

(22) *s.* *d.*
100 at 3 6
10
1 15 0
10
answer. *l.* 17 10 0

(23) $10\frac{1}{2}+2=12\frac{1}{2}$ As $12\frac{1}{2}$*d.* : 2*d.* : : 100*l.* Or, as 25 half pen. : 4 half pen. : : 100*l.* : 16*l.* answer.

(24) 125*l.* : 100*l.* : : 28*s.*
100
2800÷125=$22\frac{2}{5}$*s.* first cost.
Then, as $22\frac{2}{5}$*s.* : 112lb. : : 16*s.* : 80lbs.
5 80 5
112) 8960 80
lbs. 80 answer.

FELLOWSHIP.

CASE 1.

EXAMPLES.

(2) *L.*
A 1200
B 4800
C 2000
L. 8000 whole sum.

Then, as *L.* 8000 : *L.* 800 : :

$$\left\{\begin{array}{l} L.\ 1200 : L.\ 120 \\ 4800 : 480 \\ 2000 : 200 \end{array}\right\}\text{answer.}$$

Proof 800*L.*

(3) T.
A 48
B 36
C 24
Tuns 108 whole stock.

Then, As T. 108 : T. 45 : :

$$\left\{\begin{array}{l} \text{T. } 48 : \text{T. } 20 \text{ A's loss.} \\ 36 : 15 \text{ B's do.} \\ 24 : 10 \text{ C's do.} \end{array}\right\}\text{answer.}$$

Tuns 45 Proof.

(4) *L.* *s.* *d.* Dols.

Thus; S. 70 0 0 = 16800 S's in pence.
T. 400 0 0 = 96000 T's do.
V. 140 12 6 = 33750 V's do.

409*l* 14*s*. = 98328 pence. 146550 = whole sum in pence.

d. *d.* *L.* *d.* *d.*

Then, as
146550*d.* : 98328*d.* : : { 16880 : 11271¾+ = 46 19 3¾+S's
96000 : 64411¼+ = 268 7 7¼+T's
33750 : 22644½+ = 94 7 0½+V's }

L. *s.* *d.*

(5) Thus; A 742 12 0 = 178224 pence.
B 641 19 8 = 154076
C 987 19 9 = 237117

L. *s.* *d.*
1400 14 6 = 336174*d.* 569417 = sum in pence.

d. *d.*

Then, as *d.* *d.*
569417 : 336174 : : { 178224 : 105220¼+A's share,
154076 : 90963¾+B's do.
237117 : 139989¾+C's do. }

Lastly, Pence. *L.* *s.* *d.*
105220¼÷12 & by 20 = 438 8 4¼+A's part.
90963¾÷12 & by 20 = 379 0 3¾+B's do.
139989¾÷12 & by 20 = 583 5 9¾+C's do. } answer.

L. 1400 14 6 Proof.

(6) A. R. P.
292 3 16 = 46856 perches.

L. *L.* A. R P.
A 60 *L.* P. { 60 : 87 3 17 = A's share
B 65 then, as 200 : 46856 : : 65 : 95 0 28 = B's
C 75 75 : 109 3 11 = C's } answer.

l. 200 acres 292 3 16 Proof.

(7) A. A. *L.*
P 90 Acres. *L.* { 90 : 60 P. pays.
Q 120 As 360 : 240 : : 120 : 80 Q. do.
R 150 150 : 100 R. do. } answer.

360 acres *L.* 240 Proof.

CASE 2.

EXAMPLES.

(2) *L.* mo.

First 400× 9=3600 A's Stock and time.
680× 5=3400 B's do. do.
120×12=1440 C's do. do.

8440 Sum.

			Sum.	*L.*	*s.*	*d.*		
Then, Sum.	*L.*		3600 :	213	5	4¾	+A's	answer.
As 8440 :	500	: :	3400 :	201	8	5	+B's	
			1440 :	85	6	1¾	+C's	
						+½		
			Proof *L.*	500	0	0		

(3) Oxen.days.
40×76=3040
36×50=1800
50×90=4500

9340 Sum of Stock and time.

				L.	*s.*	*d.*		
Then, Sum.	*L.*		3040 :	6	10	2¼	A pays.	answer.
as 9340 :	20	: :	1800 :	3	17	1	B do.	
			4500 :	9	12	8¼	C do.	
			Proof	20	0	0		

(4) Thus; as 12mo. : 1800dols. : : 8 : 2700dols. Inverse.
12
21600÷8=2700 dols. answer.

(5) *L.* mo.

L. mo.	*L.* mo.
First 100×4= 400	250×5=1250
+150	+ 60
250×4=1000	310×5=1550
— 30	+100
220×4= 880	410×2= 820
A's stock&time=2280	B's stock & time=3620

continued.

L. mo.
300×3= 900
—200
100×4= 400
—50
50×5= 250

2280
3620 +
1550
7450 Sum of stock & time.

C's stock & time 1550

			Sum.	*L.*	*s.*	*d.*		
Then. Sum.	*L.*							
As 7450	: 133	::	2280 :	40	14	0¾	+A gains.	answer.
			3620 :	64	12	6	+B do.	
			1550 :	27	13	5	+C do.	

(6)

L. mo.
First, 364×4=1456
+40
404×8=3232
A's stock & time=4688

L. mo.
408×7=2856
—86
322×5=1610
B's stock & time=4466

148×3= 444
+86
234×5=1170
+100
334×4=1336
C's stock & time=2950

4688
4466 +
2950
12104 sum of their Stock & time

			L.	*s.*	*d.*		
Then, Sum	*L.*						
As 12104 :	1436 ::	4688 :	556	3	6½	A's gain.	answer.
		4466 :	529	16	9¼	B's do.	
		2950 :	349	19	8	C's do.	

(7)

L.
1st. A & B= 456
B & C= 431
C & A= 375
Num. combined=2)1262
Whole gain =*L.*631

L. B&C *L.*
Then 631—431=200 A's gain.
631—375=256 B's do.
631—456=175 C's do.

continued.

To find the value of B's cloth.

$$\text{Say inversely, thus;}\ \begin{array}{c}\text{A's gain.}\\ \left\{\begin{array}{l}\text{As } 200\\ \text{mo. } 12\end{array}\right\}\end{array} > \begin{array}{c}\text{A's stock}\\ 50\end{array} < \begin{array}{c}\text{B's gain.}\\ 256\\ \text{mo. } 8\end{array} > 96L.$$

For 256*l.*×50*l.*×12mo.÷200*l.*×8mo.=96*l.* value of B's 160 yds. of cloth.

And 96*l.* ×20=1920*s.* which÷160yds.=12*s.* per yard.

Again to find the price of C's wheat per bushel.

$$\text{Say inversely,}\ \begin{array}{c}\text{A's gain.}\\ \left\{\begin{array}{l}\text{As } 200\\ \text{mo. } 12\end{array}\right\}\end{array} > \begin{array}{c}\text{A's stock}\\ 50\end{array} < \begin{array}{c}\text{C's gain.}\\ 175\\ \text{mo. } 7\end{array} > 75l.$$

For 175*l.*×50*l.* ×12mo.÷200*l.* ×7mo.=75*L.* Value of C's 240 bushels of Wheat. And 75*l.* ×20=1500*s.* which ÷240 bushels=6¼*s.* or 6*s.* 3*d.* per bushel. answer.

EXCHANGE.

CASE 1.

EXAMPLES.

(2) 750*l.*÷15=50*l.* and 750+50=800*l.* answer.

(3)

$$15=\left\{\begin{array}{l|rrr} & L. & s. & d.\\ 3 & 173 & 16 & 0\\ \hline 5 & 57 & 18 & 8\\ \hline & +\ 11 & 11 & 8\tfrac{1}{2}+\\ \hline \text{answer}\ L. & 185 & 7 & 8\tfrac{1}{2}+\end{array}\right.$$

(4)

$$\begin{array}{r} 5)375\\ -\ 75\\ \hline \text{answer. } L.\ 300\\ \hline\end{array}$$

(5)

$$\begin{array}{rrrr} & L. & s. & d.\\ & 76 & 17 & 8\\ & 200 & 0 & 0\\ & 170 & 10 & 11\\ \hline 5) & 447 & 8 & 7\\ - & 89 & 9 & 8\tfrac{1}{2}\\ \hline \text{ans. } L. & 357 & 18 & 10\tfrac{1}{2}+\\ \hline\end{array}\ \left.\begin{array}{l}\\ \\ \\ \end{array}\right\}+$$

(6) Thus, as $\overset{d.}{90} : \overset{d.}{56} : : \overset{L.}{1500} : 933\tfrac{1}{3}l.$

$$\begin{array}{l}\ \ \ \ 1500\\ \hline 8400{,}0\div9{,}0=\overset{L.}{933}\ \ \overset{s.}{6}\ \ \overset{d.}{8d.}\ \text{answer.}\end{array}$$

(7) 4)240
—60
L. 180 answer.

(8) *L.* *s.* *d.*
2)562 13 8
6)281 6 10
+46 17 $9\frac{1}{2}$+
answer *L.* 328 4 $7\frac{1}{2}$

(9) *L.* *s.* *d.*
4)104 16 9
+26 4 $2\frac{1}{4}$
answer *l.*131 0 $11\frac{1}{4}$

(10) *L.*
3)180
+60
answer *L.* 240

(11) 9)360 From
40
40 } +
Take 80 = twice $\frac{1}{9}$
answer *l.*280

(12) *d.* *d.* *L.*
Thus; as 56 : 90 : : 475 : $763\frac{22}{56}$*l.*
For 475 × 90 & ÷ 56 = 763*l.* 7*s.* $10\frac{1}{4}$*d.*+answer.

(13) *L.* *s.* *d.*
472 16 8
2
7)945 13 4
— 135 1 $10\frac{3}{4}$+
L. 810 11 $5\frac{1}{4}$ answer.

(14) 280*L.*
2
7)560
80
+280
L. 360 answer.

(15) *L.* *s.* *d.*
96 16 $9\frac{3}{4}$
2
7)193 13 $7\frac{1}{2}$
— 27 13 $4\frac{1}{2}$
L. 166 0 3 answer.

(16) *L.* *s.* *d.*
16 = { 4)36791 14 4 From
4) 9197 18 7
Take 2299 9 $7\frac{3}{4}$
L. 34492 4 $8\frac{1}{4}$ ans.

CASE 2.

EXAMPLES.

(3)

		L.	*s.*	*d.*
25	¼	1470	12	8
10	1/10	367	13	2
1	1/10	147	1	3
½	½	14	14	1½
		7	7	0¾
answer *L.*		2007	8	3¼

(4) 4) *L.* *L.* *s.* *d.*

As 112 : 100 :: 740 14 6

28 25 5×5

3703 12 6

5

28 = { 4) 18518 2 6

{ 7) 4629 10 7½

answer *L.* 661 7 1½

(5)

		L.	*s.*	*d.*	
L. 10 =	1/10	651	14	11¾	at 12 per ct.
2 =	1/5	65	3	5¾	
		13	0	8¼	
answer *L.*		729	19	1¾	

(6)

		L.	*s.*	*d.*	
50	½	452	10	6	at 77½ per cent.
25	½	226	5	3	
2½	1/10	113	2	7½	
		11	6	3	
answer *L.*		803	4	7½	

(7)

		L.	*s.*	*d.*	
50	½	750	2	4½	at 78 per cent.
25	½	375	1	2¼	
2½	1/20	187	10	7	
½	1/5	18	15	0¾	
		3	15	0	
ans. *L.*		1335	4	2½	

(8) Thus; 167*l* 10*s* : 100*l.* :: 1341*l* 9*s* 4¾*d.* Or, as 160800qrs. : 100*l.* :: 128781100qrs. : 800$\frac{1411}{1608}$*l.* For 1287811 × 100 = 128781100 which ÷ 160800 = 800*l.* 17 6½ ans.

(9) Thus, as 144*l* : 100*l.* :: 260*l* 8*s* 6*d.* Or, as 34560*d.* : 100*l.* :: 62502 : 180$\frac{940}{3456}$*l.*
For 62502×100 = 6250200 which ÷ 34560 = 180*l.* 17*s.* ans.

(10) *L.* *s.* *d.*

50 | 1/2 | 400 17 9 at 51½ per cent.

1 | 1/50 | 200 8 10½

½ | | 4 0 2+

2 0 1

ans. *l.* 607 6 10½

(11) Liv. *d.* Liv. sol. den. As 1 : 17½ : 4226 12 8 Or, as 240*d.* : 70qrs. : : 1014392*d.* : 295864qrs. and 295864 ÷ 4 by 12 & 20 = 308*l* 3*s* 10*d.* currency. Again, as 1 liv. : 10½*d.* : : 4226 liv. 12sol. 8den. Or, as 240*d.* : 42qrs. : : 1014392*d.* : 177518qrs. or 184*l* 18*s* 3½*d.* sterling.

(12) Liv.

|3|¼|49008 at 15*d.*

+12252

2,0)6126,0

L. 3063 currency.

L.

again 3063

3

4)9189

L. 2297 5 sterling, answer.

(13) *L.* *L.* Flor.

Thus, as 104 : 100 : : 4376

6 Florins = 1*l.* 100

L. fl. sti. pen.

624 624)437600(701 1 13 13 answer.

4368

800

624

176

6

1056

624

432

20

8640

624

2400 &c.

(14) Thus; as 1flo. : 35¼*d.* : : 10235flo. 17stiv. 8pen. Or as 320pen. : 141qrs. : : 3275480pen : 1443258qrs. For 3275480 × 141 = 461842680 ÷ 320 = 1443258qrs. or 1503*l* 7*s* 10½*d.* currency.

Again, as 38*s* 6*d.* : 1*l.* : : 10235flo. 17stiv. 8pen. Or, as 3696pen. : 1*l.* : : 3275480pen. : 886*l* 4*s* 5½*d.* ster. ans.

(15) pezo. *s.* *d.* pezo. rea. marv.
Thus; as 1 : 7 6 :: 2524 . 7 33
8 12 8
8 90 20199
54 34
272 686799×90=61811910 Then,
61811910÷272=227249½*d.*=946*l* 17*s* 5½*d.* Penn. curr.

(16) Thus, as 6*s.* : 1dol. :: 1743*l* 16*s.*
20
34876÷6=5812⅔dols. answ.

(17) *s.* *d.*
*s.*5|d|¼|1186 millr. 500 reas. at 7 6 per millrea.
L. *s.* *d.*
2|6|½|296 10 Then, 17)444 18 9
148 5
3 9=500 reas. ans. *L.* 26 3 5¼ per pipe
L, 444 18 9 value of 17 pipes.

(18) *s.* *d.* *L.* G. sti.
Thus; as 35 6 : 1 :: 2714 15
6+3 sti. 20
L. *s.* *d.*
213 213)54295(254 18 1¼+answer.

(19) Thus; as 1*l.* : 33*s* 10*d.* :: 290*l* 11*s* 10*d.* Or, as 240*d.* : 406*d.* :: 69742*d.* : 117980*d.* or 491*l.* 11*s* [illegible]
Then; as 100*l.* : 117980*d.* :: 104*l* 10*s.* Or, as 2000*s.* : 117980*d.* :: 2090*s.* : 123289*d.* + and 123289 ÷ 12 & 20=513*l* 14*s* 1*d.* answer.

(20) Thus, as 47½*d.* : 1pezo. :: 1710*l* 16*s* 4*d.* Or, as 95half pen. : 1pez. :: 821192 half pen. : 8644pezo.+ For 821192÷95=8644+pezos. answer.

(21) Thus; as 64 : 1milre :: 1566*l* 6 8
20
31326
12
64)375920(5873millr.750reas. ans.

(22) Thus, as 34*s*. 4*d*. : 1*l*. : : 564*l* 10*s* 6*d*.
12 20

412 11290
12
412)135486(328*l* 16 11$\frac{3}{4}$ answer.

(23) Thus, as 4,00 reas. : 52*d*. : : 10,00 reas.
10
4)520

Then, as 34*s* 4*d*. : 1*l*. : : 130*d*. : 75$\frac{3}{4}$*d*. nearly answer.

(24) 1200Cr.$\div\frac{1}{2}$=600 and 600$\div$100=6Cr. the commission.
From 1200 Then as 55*d*. : 56*d*. : : 1194Cr. : 1215$\frac{1}{2}$+Cr.
Take 6 and 1215$\frac{1}{2}$+Cr.—1200Cr.=15$\frac{1}{2}$+Cr.
A gains, answer.
1194

REDUCTION OF VULGAR FRACTIONS.

CASE 1.

EXAMPLES.

(2) 2)$\frac{72}{94}=\frac{36}{47}$ ans. (3) 2)$\frac{84}{170}=\frac{42}{85}$ ans. (4) 5)$\frac{60}{125}=\frac{12}{52}$ ans.
(5) com.meas.
2)$\frac{182}{196}$=7)$\frac{91}{98}=\frac{13}{14}$ ans. (6) 9876)$\frac{88884}{88884}$(9 9876) $\frac{9876}{88884}$ = $\frac{1}{9}$ ans.

CASE 2.

EXAMPLES.

(2) $\frac{6}{10}=\frac{3}{5}$, $\frac{4}{8}=\frac{1}{2}$, $\frac{1}{9}$, $\frac{6}{7}$,
The fractions in their lowest terms are
$\frac{3}{5}$, $\frac{1}{2}$, $\frac{1}{9}$, $\frac{6}{7}$, Then,
3×2×9×7=378
1×5×9×7=315
1×5×2×7= 70
6×5×2×9=540
numera.

5×2×9×7=630 com. deno.
Facit $\frac{378}{630}$, $\frac{315}{630}$, $\frac{70}{630}$, & $\frac{540}{630}$.

(3) $\frac{4}{9}$, $\frac{7}{11}$, $\frac{6}{7}$ and $\frac{1}{2}$,
4×11× 7×2= 616
7× 9× 7×2= 882
6× 9×11×2=1188
1× 9×11×7= 693
Numerators.

9×11×7×2=1386 com deno.
Fac. $\frac{616}{1386}$, $\frac{882}{1386}$, $\frac{1188}{1386}$, & $\frac{693}{1386}$

(4) $\frac{6}{9}=\frac{2}{3}$, $\frac{2}{7}$, $\frac{1}{3}$ and $\frac{7}{8}$
The fractions in their lowest terms
Are $\frac{2}{3}$, $\frac{2}{7}$, $\frac{1}{3}$, and $\frac{7}{8}$
Fac. $\frac{336}{504}$, $\frac{144}{504}$, $\frac{168}{504}$, & $\frac{441}{504}$

$$\text{Then, }\left.\begin{array}{r} 2\times7\times3\times8=336\\ 2\times3\times3\times8=144\\ 1\times3\times7\times8=168\\ 7\times3\times7\times3=421 \end{array}\right\}\text{numerator.}$$
$$3\times7\times3\times8=504 \text{ co. deno.}$$

(5) $\frac{4}{5}$, $\frac{1}{2}$, $\frac{5}{6}$, and $\frac{2}{8}=\frac{1}{4}$
The fractions are $\frac{4}{5}$, $\frac{1}{2}$, $\frac{5}{6}$ & $\frac{1}{4}$

Fac. $\frac{192}{240}$, $\frac{120}{240}$, $\frac{200}{240}$ and $\frac{60}{240}$

$$\text{Then, }\left.\begin{array}{r} 4\times2\times6\times4=192\\ 1\times5\times6\times4=120\\ 5\times5\times2\times4=200\\ 1\times5\times2\times6=60 \end{array}\right\}\text{numerator.}$$
$$5\times2\times6\times4=240 \text{ co. deno.}$$

CASE 3.

EXAMPLES.

(2) $19\times18+12=\frac{354}{18}$ ans. (3) $16\times100+18=\frac{1618}{100}$ ans.
(4) $100\times59+19=\frac{5919}{59}$ ans. (5) $514\times16+5=\frac{8229}{16}$ ans.
(6) $47\times8400+3141=\frac{397941}{8400}$ ans.

CASE 4.

EXAMPLES.

(2) $\frac{141}{17}$) 141 ($8\frac{5}{17}$ Facit.
136
5
17

(3) $\frac{126}{48}$) 126 ($2\frac{30}{48}$ Facit.
96
30
48

(4) $\frac{961}{17}$) 961 ($56\frac{9}{17}$ Facit.
85
111
102
9
17

(5) $\frac{13}{7}$) 13 ($1\frac{6}{7}$ Facit.
7
6
7

(6) $\frac{3848}{21}$) 3848 ($183\frac{5}{21}$ Facit.
21
174
168
68
63
remainder 5

CASE 5.

EXAMPLES.

$$(2)\quad \frac{1}{2}\text{ of }\frac{2}{3}\text{ of }\frac{3}{4}=\frac{1\times2\times3}{2\times3\times4}=\frac{6}{24}=\frac{1}{4}\text{ Facit.}$$

$$(3)\quad \frac{7}{8}\text{ of }\frac{4}{6}\text{ of }\frac{9}{10}=\frac{7\times4\times\ 9}{8\times6\times10}=\frac{252}{480}=\frac{21}{40}\text{ Facit.}$$

$$(4)\quad \frac{12}{14}\text{ of }\frac{5}{6}\text{ of }\frac{1}{2}=\frac{12\times5\times1}{14\times6\times2}=\frac{60}{168}=\frac{5}{14}\text{ Facit.}$$

$$(5)\quad \frac{5}{9}\text{ of }\frac{4}{8}\text{ of }\frac{3}{4}=\frac{5\times4\times3}{9\times8\times4}=\frac{60}{288}=\frac{5}{24}\text{ Facit.}$$

$$(6)\quad \frac{1}{2}\text{ of }\frac{8}{9}\text{ of }\frac{6}{7}=\frac{1\times8\times6}{2\times9\times7}=\frac{48}{126}=\frac{8}{21}\text{ Facit.}$$

CASE 6.

EXAMPLES.

$$(2)\quad \frac{1}{2}\text{ of }\frac{1}{4}\text{ of }\frac{1}{12}=\frac{1\times1\times1}{2\times4\times12}=\frac{1}{96}\text{s. Facit.}$$

$$(3)\quad \frac{8}{9}\text{ of }\frac{1}{12}=\frac{8\times1}{9\times12}=\frac{8}{108}=\frac{2}{27}\text{ lb. Facit.}$$

$$(4)\quad \frac{6}{7}\text{ of }\frac{1}{28}\text{ of }\frac{1}{4}=\frac{\times1\times1}{7\times28\times4}=\frac{6}{784}=\frac{3}{392}\text{c.wt.Facit.}$$

$$(5)\quad \frac{9}{13}\text{of}\frac{1}{2}\text{of}\frac{1}{4}\text{of}\frac{1}{63}=\frac{9\times1\times1\times1}{13\times2\times\times643}=\frac{9}{6552}=\frac{3}{728}\text{hhd.Fac.}$$

$$(6)\quad \frac{10}{11}\text{ of }\frac{1}{60}\text{ of }\frac{1}{24}=\frac{10\times1\times1}{11\times60\times24}=\frac{10}{15840}=\frac{1}{1584}\text{day.Facit.}$$

CASE 7.

EXAMPLES.

$$(2)\quad \frac{1\times12\times4}{96}=\frac{48}{96}=\frac{1}{2}\text{ qr. Facit.}$$

$$(3)\quad \frac{2\times12}{27}=\frac{24}{27}=\frac{8}{9}\text{ oz. Facit.}$$

$$(4)\quad \frac{3\times4\times28}{392}=\frac{336}{392}=\frac{6}{7}\text{ lb. Facit.}$$

$$(5)\quad \frac{1\times63\times4\times2}{728}=\frac{504}{728}=\frac{9}{13}\text{ pt. Facit.}$$

$$(6)\quad \frac{1\times24\times60}{1584}=\frac{1440}{1584}=\frac{10}{11}\text{min. Facit.}$$

CASE 8.

EXAMPLES.

(2) $\frac{18\times12}{43}=\frac{216}{43}=5\frac{1}{43}$ Facit.

(3)
L. s.
$\frac{6}{7}$ of 5 9
6
7)32 14
Facit *L.* 4 13 $5\frac{1}{7}$

(4) $\frac{12}{16}$ of lb. = 12 oz.
12
16)144(9 oz. Facit
144

(5)
C. qr. lb.
$\frac{9}{11}$ of 10 1 12
9
11)93 0 24
Fac. c.wt. 8 1qr. 25lb. 1oz. 7 $\frac{3}{11}$dr.

(6) $\frac{4}{7}$ of 8 fur. = 1 mile.
4
7)32
Fur. 4 125yds. 2ft. 1in. $2\frac{1}{7}$ b. c.

(7) $\frac{4}{5}$ of $\frac{5}{1}=\frac{20}{5}=$ 4qrs. = 1yd. Fac.

(8) $\frac{6}{7}$ of $\frac{4}{1}=\frac{24}{7}$)24
Facit 3qrs. $1\frac{5}{7}$ na.

(9) 5
4 R. P.
19)20(1 $2\frac{2}{19}$
19
1
×40
19)40(2
38
rem. 2

(10) $\frac{3}{10}$ of $\frac{24}{1}=\frac{72}{10}$)72(7 12 Facit
hr. min.
70
2
×60
1,0)12,0
12 min.

(11) $\frac{1}{8}$ of 7*s* 6*d*.
12
8)90
Facit $11\frac{1}{4}$*d*.

(12) $\frac{1}{12}$ of 100*d*.
1
12)100
Facit $8\frac{1}{3}$*d*.

(13) $\frac{2}{9}$ of 21*s*.
2
9)42
Facit *s*. 4 8 ster.

$\frac{2}{9}$ of 35*s*.
2
9)70
7 $9\frac{1}{3}$ Penn. curr.

(14)

$$\begin{array}{rrrl} & L. & s. & \\ \frac{4}{5}\text{ of} & 1 & 7 & = \text{a moidore.} \\ & & 4 & \\ \hline 5) & 5 & 8 & \\ \hline \text{Facit } L. & 1 & 1 & 7\tfrac{1}{5}\text{ ster.} \end{array} \qquad \begin{array}{rrrl} & L. & s. & \\ \frac{4}{5}\text{ of} & 2 & 5s. & = \text{moidore.} \\ & & 4 & \\ \hline 5) & 9 & 0 & \\ \hline \text{Facit } L. & 1 & 16s. & \text{Penn. curr.} \end{array}$$

CASE 9.

EXAMPLES.

(2) $\frac{43\times5+1}{43\times12}=\frac{216}{516}=\frac{18}{43}s.$ Facit. (3) $\frac{9}{12}=\frac{3}{4}$lb. Fac.

(4)

$$\begin{array}{rr} L. & s. \\ 5 & 9 \\ & 20 \\ \hline & 109 \\ & 12 \\ \hline & 1308 \\ & 7 \\ \hline & 9156 \end{array} \quad \text{and} \quad \begin{array}{rrr} L. & s. & d. \\ 4 & 13 & 5\tfrac{1}{7} \\ & 20 & \\ \hline & 93 & \\ & 12 & \\ \hline & 1121 & \\ & 7 & \\ \hline & 7848 & \end{array}$$

Then measure $1308)\frac{7848}{9166}=\frac{6}{7}$Fac.

(5)

$$\begin{array}{rrrrr} C. & qr. & lb. & oz. & dr. \\ 3 & 0 & 8 & 9 & 13\tfrac{7}{13} \\ 4 & & & & \\ \hline 12 & & & & \\ 28 & & & & \\ \hline 344 & & & & \\ 16 & & & & \\ \hline 5513 & & & & \\ 16 & & & & \\ \hline 88221 & & & & \\ 13 & & & & \\ \hline 1146880 & & & & \\ \hline \end{array} \qquad \begin{array}{r} 20\text{C.}=1\text{ Ton.} \\ 4 \\ \hline 80 \\ 28 \\ \hline 2240 \\ 16 \\ \hline 35840 \\ 16 \\ \hline 573440 \\ 13 \\ \hline 7454720 \end{array}$$

Then com. mea. $573440)\frac{1146880}{7454720}=\frac{2}{13}$Facit.

(6)

$$\begin{array}{rrl} \text{Ft} & \text{in.} & \text{b.c.} \\ 2 & 8 & 1\tfrac{1}{5}. \\ 12 & & \\ \hline 32 & & \\ 3 & & \\ \hline 97 & & \\ 5 & & \\ \hline 486 & & \end{array} \qquad \begin{array}{r} \text{a yard}=3\text{ft.} \\ 12 \\ \hline 36 \\ 3 \\ \hline 108 \\ 5 \\ \hline 540 \end{array}$$

Then common measure $54)\frac{486}{540}=\frac{9}{10}$yd. Facit.

(7) A yard $=$ 4qrs. Facit $\frac{4}{5}$ ell.
An ell Eng. $=$ 5qrs.

(8) 3qrs. $\times$ 4 $+$ 2na. $=$
4qrs. $\times$ 4 $=$ $\Big\}$ $\frac{14}{16}=\frac{7}{8}$ yds. Facit.

(9) 1R. $\times$ 40 $+$ 30P. $=$ $\frac{70}{160}=\frac{7}{16}$ acres Facit.
4R. $\times$ 40 $=$

(10) 13hr. $\times$ 60 $+$ 30min. $=$ $\frac{810}{1440}=\frac{9}{16}$ day.
24 $\times$ 60 $=$

CASE 10.

EXAMPLES.

(2) Thus; As 7 : 0 : : 42 : 48 Facit $\frac{42}{48}$.

$$\begin{array}{r} 42 \\ 8 \\ \hline 336 \div 7 = 48 \end{array}$$

(3) Thus; As 3 : 4 : : 34 : $45\frac{1}{3}$ Facit $\frac{34}{45\frac{1}{3}}$

$$\begin{array}{r} 34 \\ 4 \\ \hline 136 \div = 45\frac{1}{3} \end{array}$$

(4) Thus; As 5 : 9 : : 73 : $131\frac{2}{5}$ Facit $\frac{73}{131\frac{2}{5}}$

$$\begin{array}{r} 73 \\ 9 \\ \hline 657 \div 5 = 131\frac{2}{5} \text{ denominator.} \end{array}$$

CASE 11.

EXAMPLES.

(2) Thus; As 8 : 7 : : 49 : $42\frac{7}{8}$ Facit $\frac{42\frac{7}{8}}{49}$

$$\begin{array}{r} 49 \\ 7 \\ \hline 343 \div 8 = 42\frac{7}{8} \text{ numerator.} \end{array}$$

(3) Thus; As 4 : 3 : : 46 : $34\frac{1}{2}$ Facit $\frac{34\frac{1}{2}}{46}$

$$\begin{array}{r} 46 \\ 3 \\ \hline 138 \div 4 = 34\frac{2}{4} \text{ numerator.} \end{array}$$

(4) Thus: As 9 : 5 : : $131\frac{2}{5}$: 73 Facit $\frac{73}{131\frac{2}{5}}$

$$\begin{array}{r} 9 \\ 5 \\ \hline 45 \end{array} \qquad \begin{array}{r} 131\frac{2}{5} \\ 5 \\ \hline 657 \\ 5 \\ \hline 3285 \div 45 = 73 \text{ numerator.} \end{array}$$

CASE 12.

EXAMPLES.

(3) Thus; $34\times2+1=23)\frac{69}{92}=\frac{3}{4}$ Facit.
$46\times2=$

(4) Thus; $34\times3=34)\frac{102}{136}=\frac{3}{4}$ Facit.
$45\times3+1=$

(5) Thus; $17\times9+4=\frac{157}{387}$ Facit.
$43\times9=$

(6) Thus; $7\times5=7)\frac{35}{98}=\frac{5}{14}$ Facit.
$19\times5+3=$

ADDITION OF VULGAR FRACTIONS.

EXAMPLES.

(2) $3)\frac{7}{10},\frac{11}{12},\frac{4}{9}$ and $3\times2\times5\times2\times3=180$ least com. denom.
$2)10,\ 4,\ 3,$ then, $180\div10\ \&\times\ 7=126$
$5,\ 2,\ 3$ $180\div12\ \&\times11=165$ numerators.
$180\div\ 9\ \&\times\ 4=\ 80$

com. denom. $=180)371(2\frac{11}{180}$ Facit.

(3) $\frac{1}{2}$ of $\frac{2}{3}=\frac{2}{6}=\frac{1}{3}$ Then, $19+7+\frac{1}{3}=26\frac{1}{3}$ Facit.

(4) $\frac{2}{4}$ of $\frac{7}{8}=\frac{14}{32}=\frac{7}{16}$ and $\frac{4}{6}$ of $\frac{19}{20}=\frac{76}{120}=\frac{19}{30}$
Then $7\times30=210$
$19\times16=304$
514 And $514\div480=1\frac{34}{480}$, or, $1\frac{17}{240}$ Facit.
$16\times30=480$

(5) $\frac{1}{3}$ of $\frac{95}{1}=\frac{95}{3}$
And $\frac{7}{8}$ of $\frac{14}{1}=\frac{98}{8}=\frac{49}{4}$
The fractions are $\frac{95}{3}$ & $\frac{49}{4}$
Then $95\times4=380$
$49\times3=147$
527
$\overline{3\times4=12}=43\frac{11}{12}$ Facit.

(6) $\frac{2}{3}$ and $\frac{1}{2}$
$2\times2=4$
$1\times3=3$
7
$\overline{3\times2=6}=1\frac{1}{6}$
Then $17+1\frac{1}{6}=18\frac{1}{6}$ Facit.

(7) $\frac{1}{2},\frac{2}{3}$ and $\frac{3}{4}$
$1\times3\times4=12$
$2\times2\times4=16$
$3\times2\times3=18$
46
$\overline{2\times3\times4=24}=1\frac{11}{12}$
Then $12+3+4+1\frac{11}{12}=20\frac{11}{12}$ Fac.

(8) $\frac{7}{8}$ of $\frac{9}{10}=\frac{63}{80}$ and
$\frac{4}{7}$ of $\frac{1}{2}=\frac{4}{14}=\frac{2}{7}$
The fractions are $\frac{63}{80}$, $\frac{2}{7}$ & $\frac{1}{2}$

Then $63\times7\times2=882$
$2\times80\times2=320$
$1\times80\times7=560$

$$\frac{1762}{80\times7\times2=1120}=1\frac{642}{1120}$$

Then $6+7+1\frac{642}{1120}=14\frac{642}{1120}$ Facit.

(9) $\frac{4}{5}$ of $\frac{1}{3}=\frac{4}{15}$, Then the fractions are $\frac{3}{5}$, $\frac{4}{15}$ and $\frac{3}{20}$,
$3\times15\times20=900$
$4\times5\times20=400$
$3\times5\times15=225$

$$\frac{1525}{5\times15\times20=1500}=1\frac{1}{60}$$

Then $9+1\frac{1}{60}=10\frac{1}{60}$ Facit.

(10) $\frac{1}{9}$ *L.* 1*L.*
20
9)20
2 2 $\frac{1}{2}$, $\frac{2}{3}$
+0 0 $\frac{3}{4}$
L. 2 3 $\frac{1}{4}$, $\frac{2}{3}$

(11) $\frac{7}{8}$ *L.* and $\frac{3}{4}$*s.*
s. *d.*
Thus, $7\times20\div8=17$ 6
$3\times12\div4=$ 0 9
Facit *s.* 18 3

(12) $\frac{7}{12}$ of $\frac{1}{12}=\frac{7}{144}$
the fractions are $\frac{7}{144}$lb. $\frac{1}{2}$lb.
$7\times2=14$
$1\times144=144$
158
$144\times2=288$

And oz.dwt.gr.
$158\times12\div288=$6 11 16 Fac.

(14) $\frac{3}{4}$M. and $\frac{7}{16}$ fur.$=\frac{7}{80}$M.
$3\times80=240$
$7\times4=28$
268
$4\times80=320$
and $268\times8\div320=6\frac{224}{320}$ fur.
or, 6fur. 28P. Facit.

(13) Thus, $\frac{4}{7}$T. and $\frac{9}{10}$C.
4
×20
7)80(11C.
77
3
×4
7)12(1qr.
—7
5
×28
7)140
20 lbs.

9
×4
10)3,6
qrs. 3–6
×28
10)16,8
lbs. 16–8
×16
10)12,8
oz. 12–8
×16
10)12,8

continued,

(13) continued; C. qr. lb. oz.
0 3 16 12 12$\frac{4}{5}$drs.
11 1 20 0 0
Facit 12 1 8 12 12$\frac{4}{5}$ drs.

(15) $\frac{1}{2}$yd. and $\frac{2}{3}$ft.
ft. in.
1× 3÷2=1$\frac{1}{2}$ft.=1 6
2×12÷3= 0 8
Facit 2 2

(16) $\frac{1}{3}$day and $\frac{1}{2}$hr.
hr. min.
Thus, 1×24÷3=8 0
1×60÷2=0 30
Facit 8 30

(17) $\frac{1}{3}$W. $\frac{1}{4}$d. $\frac{1}{2}$hr.
d. d. hr.
Thus, 1× 7÷3=2$\frac{1}{3}$=2 8
1×24÷4= 0 6
$\frac{1}{2}$ hour = 0$\frac{1}{2}$
Facit days 2 14$\frac{1}{2}$

(18) $\frac{2}{3}$yd. $\frac{3}{4}$ft. and $\frac{7}{8}$mile.
yd. ft. in.
Thus, 2×3÷3=0 2 0
3×12÷4=0 0 9
7×1760÷8=1540 0 0
Facit yds. 1540 2 9

s. d.
(19) $\frac{1}{7}$L. 1×20÷ 7=2$\frac{6}{7}$s=2 10$\frac{1}{4}$, $\frac{1}{7}$ 3(21 C.D.
$\frac{2}{9}$s. 2×12÷ 9= 0 2$\frac{1}{2}$, $\frac{2}{3}$ 14
$\frac{5}{12}$d. 5× 4÷12= 0 0$\frac{1}{4}$, $\frac{2}{3}$ 14
Facit s. 3 1$\frac{1}{4}$, $\frac{10}{21}$

(20) $\frac{2}{7}$ of $\frac{15}{1}$L=$\frac{30}{7}$L. 3$\frac{3}{7}$L=3×7+3=$\frac{24}{7}$L.
$\frac{1}{3}$ of $\frac{5}{7}$ of $\frac{3}{5}$=$\frac{15}{105}$=$\frac{1}{7}$L. $\frac{2}{3}$ of $\frac{3}{7}$ of $\frac{1}{20}$=$\frac{6}{420}$=$\frac{1}{70}$L.
Then the fractions are $\frac{30}{7}$L. $\frac{24}{7}$L. $\frac{1}{7}$L. and $\frac{1}{70}$L. Therefore,
30×7×7×70=102900
24×7×7×70= 82320
1×7×7×70= 3430
1×7×7× 7= 343

188993
——— =7$\frac{20923}{24010}$l. or, L.7 17 5 0qr. $\frac{4}{7}$qr. Fa.
7×7×7×70=24010

(21) $\frac{2}{5}$ of $\frac{12}{1}$=$\frac{24}{5}$L.
4$\frac{3}{7}$l.=$\frac{31}{7}$L.
$\frac{1}{5}$ of $\frac{9}{10}$=$\frac{9}{50}$L.
$\frac{3}{5}$ of $\frac{5}{6}$ of $\frac{1}{20}$=$\frac{1}{40}$L.
The fractions are
$\frac{24}{5}$, $\frac{31}{7}$, $\frac{9}{50}$ and $\frac{1}{40}$L.

Then, 24×7×50×40=33600^{0}
31×5×50×40=31000^{0}
9×5× 7×40= 1260^{0}
1×5× 7×50= 175^{0}
660350
5×7×50×40=70000

And 660350÷70000=9$\frac{30350}{70000}$L.=9l 8s 8d. 0qr.$\frac{9}{35}$qr. Fac.

(22) $\frac{3}{8}+\frac{5}{16}$
$3\times16=48$
$5\times\ 8=40$
88
——$=\frac{11}{16}$ A's part.
$8\times16=128$

Then, as 16pt. : 1500*l.* :: 11parts : 1031$\frac{1}{4}$*l.*
11
16)16500(1031*l.* 5*s.* Facit.
16
5 &c.

SUBTRACTION OF VULGAR FRACTIONS.

EXAMPLES.

(2) $\frac{97}{100}-\frac{3}{7}$
$97\times7=679$
$100\times3=300$ deduct.
remains 379
$100\times7=700$ Facit.

(3) $1\times7=7$ } nume-
$3\times3=9$ } rator.
$3\times7=21$ com. deno.
then, $96\frac{7}{21}$
$-14\frac{9}{21}$
$81\frac{19}{21}$ Fa.

(4) Thus, from 96
take $0\frac{3}{5}$
Facit $95\frac{2}{5}$

(5) $\frac{3}{9}$ of $\frac{76}{1}=\frac{228}{9}=25\frac{1}{3}$ ·· 4(12 co. den.
$\frac{9}{12}$ of $\frac{21}{1}=\frac{189}{12}=15\frac{3}{4}$ ·· 9
Facit $9\frac{7}{12}$

(6) $\frac{1}{2}$ of $\frac{2}{3}$ of $\frac{3}{4}=\frac{1}{4}$ then,
$\frac{109}{110}\times\frac{1}{4}$
$\frac{436}{440}-\frac{110}{440}=\frac{326}{440}=\frac{163}{220}$ Facit.

(7) $\frac{1}{2}\times\frac{17}{19}$
$\frac{19}{38}$ $\frac{34}{38}$
Then, $71\frac{19}{38}-\frac{34}{38}=70\frac{13}{38}$ rem.

(8) $\frac{2}{3}$ of $\frac{19}{1}=\frac{38}{3}=12\frac{2}{3}$
Then, From $14\frac{1}{4}$ ·· 3(12C.D.
$12\frac{2}{3}$ 8
remains $1\frac{7}{12}$

(9) $\frac{1}{2}l.=1\times20\div2=10s\ 0d.$
$\frac{3}{4}s.=1\times12\div4=$ 0 9
Facit *s.* 9 3

(10) $\frac{1}{2}s.=1\times12\div2=6d.$
$-0\frac{3}{4}$
Facit *d.* $5\frac{1}{4}$

(11) $\frac{7}{8}$ of $\frac{1}{20}=\frac{7}{160}$ oz.
$\frac{3}{5}\times\frac{7}{160}$
$\frac{480}{800}-\frac{35}{800}=\frac{445}{800}$ oz.
And $445\times20\div800=11\frac{1}{8}$ dwt.
=11dwt. 3gr.

(12) $\frac{7}{12}$ of $\frac{1}{28}$ of $\frac{1}{4}=\frac{7}{1344}$C.
Then $\frac{1}{2}\times\frac{7}{1344}$ And
$\frac{1344}{2688}-\frac{14}{2688}=\frac{1330}{2688}$ C.wt. Or,
1qr. 27lb. 6 oz. 10$\frac{2}{3}$drs. Facit.

(13) $\frac{7}{10}$ of $\frac{1}{3}=\frac{7}{30}$ leagues.
Then $\frac{2}{3}\times\frac{7}{30}$
$\frac{60}{90}-\frac{21}{90}=\frac{39}{90}$ leagues.
And $39\times3\div90=1$M.
2 fur. 16 perc. answer.

(14) $\frac{7}{10}$ of $\frac{1}{5}=\frac{7}{50}$ E.E.

1E.E.$=$1yd. 1qr. 0na.

$7\times5\times4\div50=$—0 $2\frac{4}{5}$

Facit yd. 1 0 $1\frac{1}{5}$

(15) $7)9\frac{7}{10}d.$

$1\frac{27}{70}$ week.

&$27\times7\div70=$2da. 16hr. 48m.

Then from 7w. 0d. 0hr. 0min.

take 1 2 16 48

Facit w. 5 4 7 12

(16) First, $\frac{1}{2}\bowtie\frac{1}{18}$

$\frac{18}{36}-\frac{6}{36}=\frac{12}{36}=\frac{1}{3}$

Then, from 4da. $7\frac{1}{3}$hr.

take 1 9

Facit days 2 $22\frac{1}{3}$

(17) $5\frac{3}{8}=\frac{43}{8}L.$

And $\frac{2}{7}$ of $4\frac{1}{6}=\frac{2}{7}$ of $\frac{25}{6}=\frac{50}{42}=\frac{25}{21}l.$

Then $\frac{43}{8}\bowtie\frac{25}{21}$

$\frac{903}{168}-\frac{200}{168}=\frac{703}{168}=L.$ 4 3 $8\frac{1}{4}$&$\frac{1}{7}$ answer.

(18) $\frac{2}{3}$ of $\frac{3}{4}$ of $\frac{1}{20}=\frac{6}{240}=\frac{1}{40}L.$

Then $\frac{5}{9}\bowtie\frac{1}{40}$

$\frac{200-9}{360}=\frac{191}{360}L.$ And

$191\bowtie20\div360=10s\ 7\frac{1}{4}d,\frac{1}{3}$ answer.

Or thus;

5

20

$9)\overline{100}$

From s. 11 $1\frac{1}{4},\frac{1}{3}$

$-\frac{2}{3}$ of $\frac{3}{4}s.=0$ 6

answer s. 10 $7\frac{1}{4},\frac{1}{3}$

(19) $\frac{3}{5}$ of $\frac{1}{20}=\frac{3}{100}L.$ and $\frac{2}{7}$ of $5\frac{1}{6}=\frac{2}{7}$ of $\frac{31}{5}=\frac{62}{42}=\frac{31}{21}L.$

$\frac{31}{21}\bowtie\frac{3}{100}$

$\frac{3100-63}{2100}=\frac{3037}{2100}=1\frac{937}{2100}L.$ or 1*l* 8*s* $11\frac{3}{35}d.$ answer.

(20) $\frac{2}{3}$ of $\frac{5}{8}=\frac{10}{24}=\frac{5}{12}$ parts.

Then, $\frac{5}{8}\bowtie\frac{5}{12}$

$\frac{60-40}{96}=\frac{20}{96}=\frac{5}{24}$ parts.

pts. *L.* pts.

Then, as, 24 : 900 : : 5

5

24)4500(187*l.* 10*s.* answer.

24

210

192

180

168

$\frac{12}{24}L.=10s.$

MULTIPLICATION OF VULGAR FRACTIONS.

EXAMPLES.

(2) $\frac{4}{8}\times\frac{7}{9}=\frac{28}{72}=\frac{7}{18}$ Facit. (3) $\frac{1}{3}$ of $\frac{4}{5}=\frac{4}{15}$ & $\frac{7}{10}$ of $\frac{11}{12}=\frac{77}{120}$ Then, $\frac{4}{15}\times\frac{77}{120}=\frac{308}{1800}=\frac{77}{450}$ Facit.

(4) $7\frac{1}{4}=\frac{29}{4}$

$8\frac{1}{2}=\frac{17}{2}$

$\frac{29}{4}\times\frac{17}{2}=\frac{493}{8}=61\ \frac{5}{8}$ Facit.

(5) $4\frac{1}{2}=\frac{9}{2}\times\frac{1}{8}=\frac{9}{16}$ Facit.

(6) $13\frac{9}{10}=\frac{139}{10}$ & $\frac{7}{8}\times\frac{139}{10}=\frac{973}{80}=12\frac{13}{80}$ Facit.

(7) $\frac{1}{2}$ of $\frac{7}{1}=\frac{7}{2}$ & $\frac{7}{2}\times\frac{3}{6}=\frac{21}{12}=1\frac{3}{4}$ Facit.

(8) $\frac{3}{5}$ of $\frac{8}{1}=\frac{24}{5}$ & $\frac{7}{8}$ of $\frac{5}{1}=\frac{35}{8}$ Then, $\frac{24}{5}\times\frac{35}{8}=\frac{840}{40}=21$ facit.

(9) $\frac{4}{9}$ of $\frac{11}{1}=\frac{44}{9}$ Then, $\frac{3}{6}\times\frac{44}{9}=\frac{132}{54}=2\frac{4}{9}$ Facit.

(10) $\frac{4}{5}$ of $\frac{91}{1}=\frac{364}{5}$ & $71\frac{1}{2}=\frac{143}{2}$ then $\frac{364}{5}\times\frac{143}{2}=\frac{52052}{10}=5205\frac{1}{5}$

(11) $12\frac{3}{5}=\frac{63}{5}$ & $\frac{1}{3}$ of $\frac{7}{1}=\frac{7}{3}$ then $\frac{63}{5}\times\frac{7}{3}=\frac{441}{15}=29\frac{2}{5}$ Facit.

(12) $7\frac{1}{2}=\frac{15}{2}$ & $9\frac{1}{4}=\frac{37}{4}$ then $\frac{15}{2}\times\frac{37}{4}=\frac{555}{8}=69\frac{3}{8}$ Facit.

(13) $\frac{2}{9}$ of $\frac{3}{5}=\frac{6}{45}$ & $\frac{5}{8}$ of $3\frac{2}{7}=\frac{115}{56}$ then $\frac{6}{45}\times\frac{115}{56}=\frac{690}{2520}=\frac{23}{84}$ fa.

(14) Thus ; $\frac{2}{7}$ of $\frac{3}{5}=\frac{6}{35}$ & $4\frac{1}{6}=\frac{25}{6}$ Then,

$\frac{5}{1}\times\frac{2}{3}\times\frac{6}{35}\times\frac{25}{6}=\frac{1500}{630}=2\frac{8}{21}$ answer.

(15) Thus; $3\frac{1}{4}=\frac{13}{4}$ & $\frac{3}{4}$ of $\frac{3}{5}=\frac{9}{20}$ Then,

$\frac{2}{3}\times\frac{13}{4}\times\frac{5}{1}\times\frac{9}{20}=\frac{1170}{240}=4\frac{7}{8}$ answer.

(16) Thus; $3\frac{2}{3}=\frac{11}{3}$ & $\frac{3}{5}$ of $\frac{3}{4}=\frac{9}{20}$ Then,

$\frac{11}{3}\times\frac{1}{7}\times\frac{9}{20}=\frac{99}{420}=\frac{33}{140}$ answer.

DIVISION OF VULGAR FRACTIONS.

EXAMPLES.

(2) $\frac{13}{19}\times\frac{7}{9}$
Facit $\frac{117}{133}$

(3) $\frac{14}{18}\times\frac{7}{10}$
Facit. $\frac{140}{126}=1\frac{1}{9}$

(4) $1\frac{1}{2}$ $4\frac{8}{10}$
$\frac{2}{}$ $\frac{10}{}$
$\frac{3}{2}\times\frac{48}{10}$
$\frac{30}{90}=\frac{5}{16}$ Facit.

(5) $\frac{7}{8}\times\frac{4}{1}$
Facit $\frac{7}{32}$

(6) $\frac{4}{1}\times\frac{7}{8}$
Facit $\frac{32}{7}=\frac{4}{7}$

(8) $\frac{1}{2}$ of $\frac{2}{3}=\frac{1}{3}$
and $\frac{2}{3}$ of $\frac{3}{4}=\frac{1}{2}$
Then $\frac{1}{3}\times\frac{1}{2}$ Facit $\frac{2}{3}$

(7) $\frac{2}{3}$ of $\frac{3}{4}=\frac{1}{2}$ & $\frac{1}{5}$ of $\frac{19}{1}=\frac{19}{5}$, Then
$\frac{19}{5}\div\frac{1}{2}=\frac{38}{5}=7\frac{3}{5}$ Facit.

(9) $\frac{2}{3}$ of $\frac{3}{4}=\frac{7}{12}$ or, $\frac{1}{2}$ & $\frac{1}{2}$ of $\frac{2}{3}=\frac{1}{3}$ Then, $\frac{1}{2}\div\frac{1}{3}=\frac{3}{2}=1\frac{1}{2}$ Facit.

(10) $4\frac{5}{9}=\frac{41}{9}$ and $\frac{5}{9}$ of $\frac{4}{1}=\frac{20}{9}$ Then, $\frac{41}{9}\div\frac{20}{9}=\frac{369}{180}=2\frac{1}{20}$ Facit.

(11) $\frac{5}{9}$ of $\frac{4}{1}=\frac{20}{9}$ & $4\frac{5}{9}=\frac{41}{9}$ Then, $\frac{20}{9}\div\frac{41}{9}=\frac{180}{369}=\frac{20}{41}$ Facit.

(12) $\frac{7}{8}$ of $\frac{6}{1}=\frac{42}{8}$ and $\frac{3}{4}$ of $\frac{6}{7}$ of $\frac{11}{12}=\frac{198}{336}=\frac{33}{56}$ Then,
$\frac{42}{8}\div\frac{33}{56}=\frac{2352}{264}=8\frac{10}{11}$ Facit.

(13) $7\frac{1}{3}=\frac{22}{3}$ and $9\frac{5}{9}=\frac{86}{9}$ then, $\frac{22}{3}\div\frac{86}{9}=\frac{198}{258}=\frac{33}{43}$ answer.

(14) $\frac{2}{3}$ of $\frac{1}{3}=\frac{2}{9}$ and $\frac{5}{7}$ of $7\frac{3}{5}=\frac{5}{7}$ of $\frac{38}{5}=\frac{190}{35}=\frac{38}{7}$ Then,
$\frac{2}{9}\div\frac{38}{7}=\frac{14}{342}=\frac{7}{171}$ answer.

(15) $5205\frac{1}{5}=\frac{26026}{5}$ and $\frac{4}{5}$ of $\frac{91}{1}=\frac{364}{5}$ Then,
$\frac{26026}{5}\div\frac{364}{5}=\frac{130130}{1820}=71\frac{1}{2}$ answer.

THE SINGLE RULE OF THREE DIRECT, IN VULGAR FRACTIONS.

EXAMPLES.

(2) Thus; As $\frac{11}{13}$lb. : $\frac{7}{15}$*s.* :: $\frac{32}{43}$lb. : $\frac{2912}{7095}$*s.* For $\frac{13}{11}\times\frac{7}{15}\times\frac{32}{43}=\frac{2912}{7095}=4d.\frac{3}{4}\frac{1657}{2365}$ qrs. answer.

(3) Thus; As $\frac{4}{7}$E.E. : $\frac{7}{13}$*L.* :: $\frac{5}{1}$E.E. : $\frac{49}{52}$*L.* For $\frac{7}{4}\times\frac{7}{13}\times\frac{1}{1}=\frac{49}{52}$*L.*=1[illegible]*s.* $10\frac{2}{12}$*d.* answer.

(4) $16\frac{5}{12}$*s.*=$\frac{197}{12}$*s.* Then, as $\frac{2}{1}$ oz : $\frac{197}{12}$*s.* :: $\frac{3}{4}$ oz. : $\frac{591}{96}$*s.* For $\frac{1}{2}\times\frac{197}{12}\times\frac{3}{4}=\frac{591}{96}$*s.*=6*s.* 1*d.* $\frac{3}{4}$qr. $\frac{1}{2}$. answer.

(5) $6\frac{1}{2}=\frac{13}{2}$=the first term; $9\frac{1}{4}=\frac{37}{4}$ the third term, Then as $\frac{13}{2}$yd. : $\frac{18}{1}$*s.* :: $\frac{37}{4}$yd. : $\frac{1332}{52}$*s.* For $\frac{2}{13}\times\frac{18}{1}\times\frac{37}{4}=\frac{1332}{52}$*s.* or 1*l* 5*s* $7\frac{1}{4}$*d.* $\frac{7}{13}$.

(6) Thus; As $\frac{1}{1}$bu. : $\frac{243}{5}d.$ :: $\frac{500}{1}$bu. : $\frac{141500}{5}d.$ For 243×500÷5=28300$d.$ which÷12 & 20=117$l.$ 18 4 ans.

(7) $1\frac{1}{4}=\frac{4}{5}$ & $16\frac{1}{4}=\frac{65}{4}$. Then, as $\frac{5}{4}$yd. : $\frac{9}{1}s.$ :: $\frac{65}{4}$yd. : $\frac{2340}{40}s.$ For $\frac{4}{5}\times\frac{9}{1}\times\frac{65}{4}=\frac{2340}{20}s.$=5$l.$ 17$s.$ answer.

(8) $17\frac{1}{5}s.=\frac{86}{5}s.$ Then, as 1yd. : $\frac{86}{5}s.$ :: 100yd. : $\frac{8600}{5}s.$ For 86×100÷5=1720s which÷20=86$l.$ answer.

(9) $5\frac{1}{2}s.=\frac{11}{2}$ & $16\frac{11}{15}$oz.$=\frac{251}{15}$. Then, as $\frac{1}{1}$oz. : $\frac{11}{2}s.$ :: $\frac{251}{15}$ oz. : $\frac{2761}{30}s.$ For $\frac{11}{2}\times\frac{251}{15}=\frac{2761}{30}s.$ And 27[illegible]÷30= $92\frac{1}{30}s.$ or 4l 12s 0$d.$ 1qr.$\frac{3}{5}$ answer.

(10) $14\frac{4}{20}=\frac{284}{20}$ & $7\frac{1}{2}$C.$=\frac{15}{2}$. Then, as $\frac{9}{10}$C. : $\frac{284}{20}l.$ :: $\frac{15}{2}$C. : $\frac{42600}{360}l.$ For $\frac{10}{9}\times\frac{284}{20}\times\frac{15}{2}=\frac{42600}{360}l.$=118$l$ 6s 8$d.$ answer.

(11) $\frac{2}{3}$ of $\frac{19}{1}=\frac{38}{3}s.$ Then, as $\frac{3}{5}$E.E. : $\frac{38}{3}s.$ :: $\frac{7}{1}$E.E. : $\frac{1330}{9}s.$ For $\frac{5}{3}\times\frac{38}{3}\times\frac{7}{1}=\frac{1330}{9}=147\frac{7}{9}s.$ or 7$L.$ 7s 9$d.$ 1 qr. $\frac{1}{3}$. answer.

(12) 4s $9\frac{3}{5}d.$ =$57\frac{3}{5}d.$ which÷8lb.=$7\frac{1}{5}d.$ per. lb. answer.

(13) $15\frac{5}{8}s=\frac{125}{8}s.$ and $27\frac{3}{8}$yds.×4=$109\frac{1}{2}=\frac{219}{2}$yds. Then, as $\frac{1}{1}$yd. : $\frac{125}{8}s.$ :: $\frac{219}{2}$yd. : $\frac{27375}{16}s.$ & 27375 ÷16=$1710\frac{15}{10}s.$ or 85l 10s $11\frac{1}{4}d.$ answer.

(14) 6s $0\frac{1}{2}d.$ =$72\frac{1}{2}d.=\frac{145}{2}d.$ and $24\frac{1}{3}\times3\frac{1}{2}=85\frac{1}{6}$ yds. the quantity. $85\frac{1}{6}$yds$=\frac{511}{6}$yd. Then, as $\frac{1}{1}$yd. : $\frac{145}{2}d.$ :: $\frac{511}{6}$yd : $\frac{74095}{12}d.$ For $\frac{145}{2}\times\frac{511}{6}=\frac{74095}{12}d.$ and 74095 ÷12=$6174\frac{7}{12}d.$ or 25l 14s $6\frac{1}{2}d.$ $\frac{1}{3}$. answer.

(15) $\frac{1}{3}\times\frac{1}{6}$ $\frac{1}{5}$ of $\frac{2}{1}=\frac{2}{5}$lb. & 14lb.—$\frac{3}{5}=13\frac{3}{5}$ lb. = $\frac{68}{5}$lb.
$\frac{6}{18}-\frac{3}{18}=\frac{3}{18}=\frac{1}{6}$lb. 1st, term; also $13\frac{1}{5}s.=\frac{66}{5}s.$ 2d. term.
Then, as $\frac{1}{6}$lb. : $\frac{66}{5}s.$ :: $\frac{68}{5}$lb. : $\frac{26928}{25}s.$ For $\frac{6}{1}\times\frac{66}{6}\times\frac{68}{5}$ $=\frac{26928}{25}s.$ =4l 9s $9\frac{3}{25}d.$ answer.

(16) 120 at $8\frac{5}{8}s.$

$\frac{4}{8}$	$\frac{1}{4}$	12	0	at 2$s.$
			4	
		48	0	
$\frac{1}{8}$	$\frac{1}{4}$	3	0	
		0	15	

L. 51 15 Prime cost.

	L.	*s.*	
From	70	0	sold for
Ta[illegible]	51	15	bought for
L.	18	5	whole gain.

Then, as 51l 15$s.$: 18l 5$s.$ :: 100$l.$: 35l 5s $3\frac{3}{4}d.$ $\frac{53}{69}$ answer.

(17) $17\frac{5}{8}l. = \frac{141}{8}l.$ & $13\frac{2}{3}$lb. $= \frac{41}{3}$ lb. Then, as $\frac{112}{1}$ lb. : $\frac{141}{8}l.$ :: $\frac{41}{3}$lb. : $\frac{5781}{2688}l.$ For $\frac{1}{112} \times \frac{141}{8} \times \frac{41}{3} = \frac{5781}{2688} = 2\frac{405}{2688}l.$ or $2l$ $3s.$ $\frac{3}{224}$ answer.

(18) $1s. \times 12 + 3 = \frac{15}{240} = \frac{2}{16}L.$ and $73\frac{1}{16}l. = \frac{1169}{16}l.$
$1l. \times 20 \times 12 = 240$ and $250l$ $10s = 250\frac{1}{2}l = \frac{501}{2}L.$
Then, as $\frac{1169}{16}l.$: $\frac{1}{1}$pt. :: $\frac{501}{2}l.$: $\frac{8016}{18704}$pt. For $\frac{16}{1169} \times \frac{1}{1} \times \frac{501}{2} = \frac{8016}{18704} = \frac{3}{7}$. answer.

(19) mul. $3\frac{1}{2}$ and $1\frac{1}{2}$ } $12\frac{1}{4}$lb. $= \frac{49}{4}$lb. and $2\frac{1}{4}l. = \frac{9}{4}l.$
by $3\frac{1}{2}$ by $1\frac{1}{2}$ }

$10\frac{1}{2}$ $\frac{1}{2})1\frac{1}{2}$ $\frac{1}{2}$ of $\frac{1}{3}$ of $\frac{49}{4} = \frac{49}{24}$lb.
$3\frac{1}{2} \div \frac{1}{2} = 1\frac{3}{4}$ $0\frac{3}{4}$

$12\frac{1}{4}$lb. $2\frac{1}{4}$lb. Then, as $\frac{49}{4}$lb. : $\frac{9}{4}$lb. : $\frac{49}{24}$ lb. :: $\frac{1764}{4704}l.$

For $\frac{4}{49} \times \frac{9}{4} \times \frac{49}{24} = \frac{1764}{4704}L.$ and $1764 \times 20s \div 4704 = 7\frac{1}{2}s.$ or $7s$ $6d.$ answer.

(30) $22\frac{3}{8} \times 4\frac{3}{4}$ $8\frac{3}{4}s. = \frac{35}{4}s.$ second term.
8 4

$\frac{179}{8} \times \frac{19}{4} = \frac{3401}{32}$yds. Then, as $\frac{1}{1}$yd. : $\frac{35}{4}s.$ :: $\frac{3401}{34}$ yd. :: $\frac{119035}{128}s.$ For $\frac{35}{4} \times \frac{3401}{32} = \frac{119035}{128} = 929\frac{123}{128}s. = 46L.$ $9s$ $11d.$ 2qrs. $\frac{1}{8}$. answer.

(21) $\frac{2}{3}$ of $\frac{4}{5} = \frac{8}{15}$ Then, as 8 parts : $319L.$ :: 15 parts : $598l$ $2s$ $6d.$ answer.

THE SINGLE RULE OF THREE INVERSE, IN VULGAR FRACTIONS.

EXAMPLES.

(2) $1\frac{1}{5}$yd. $= \frac{6}{5}$ & $3\frac{1}{4}$yd. $=$ [illegible] Then, as $\frac{6}{5}$ yd. : $\frac{13}{4}$yd. :: inverted. $\frac{4}{5}$yd. : $4\frac{7}{8}$yds. For $\frac{6}{5} \times \frac{13}{4} \times \frac{5}{4} = \frac{390}{80} = 4\frac{7}{8}$yds. $=$ 4yds. 3 qrs. 2na. answer.

(3) $28\frac{1}{3}$ da. $= \frac{85}{3}$ days. Then, as $\frac{16}{1}$ m. : $\frac{85}{3}$ :: $\frac{12}{1}$ m. : inverted. $\frac{1360}{36}$ days. For $\frac{16}{1} \times \frac{85}{3} \times \frac{1}{12} = \frac{1360}{36}$ days. (i.e.) $1360 \div 36 = 37\frac{7}{9}$ days. answer.

(4) $20\frac{1}{2}$yds. $=\frac{41}{2}$ & $1\frac{1}{4}$yd. $=\frac{5}{4}$. Then, as $\frac{5}{4}$yd. : $\frac{41}{2}$yd. : :
inverted.
$\frac{3}{4}$yd. : $\frac{820}{24}$yds. For $\frac{5}{4}\times\frac{41}{2}\times\frac{4}{3}=\frac{820}{24}$yds. $820\div24=$ $34\frac{1}{6}$yds. answer.

(5) As 3 : $4\frac{1}{2}$: : 10 : $1\frac{7}{20}$hr. For $4\frac{1}{2}\times3\div10=1\frac{7}{10}$hr. or 1hr. 21 min. answer.

(6) $5\frac{1}{2}$*s.* $=\frac{11}{2}$ & $2\frac{1}{2}$oz. $=\frac{5}{2}$oz. Then, as $\frac{7}{1}$oz. : $\frac{11}{2}$*s.* : : $\frac{5}{2}$oz. :
$15\frac{4}{10}$*s.* inverted.
For $\frac{7}{1}\times\frac{11}{2}\times\frac{2}{5}=\frac{154}{10}=15\frac{4}{10}$*s.* $=15$*s* 4*d.* 3qrs. $\frac{1}{5}$ answer.

(7) $6\frac{1}{4}$*s.* $=\frac{25}{4}$*s.* $4\frac{1}{2}$*s.* $=\frac{9}{2}$*s.* Then, as $\frac{25}{4}$*s.* : $\frac{9}{1}$oz. : : $\frac{9}{2}$*s.* :
inverted.
$\frac{450}{36}$oz. $=12\frac{1}{2}$oz. For $\frac{25}{4}\times\frac{9}{1}\times\frac{2}{9}=\frac{450}{36}$oz. and $450\div36=$ $12\frac{1}{2}$oz. $=12$ oz. 8dr. answer.

(8) $3\times4=12$ Then as 3qr. : 12yd. : : 4qr. : 9yds. ans.

(9) $1\frac{1}{4}$yd. $=\frac{5}{4}$yd. Thus, as $\frac{5}{4}$yd. : $\frac{275}{1}$yd. : : $\frac{3}{4}$yd. : $\frac{5500}{12}$
inverted.
yds. For $\frac{5}{4}\times\frac{275}{1}\times\frac{4}{3}=\frac{5500}{12}$yds. and $5500\div12=458\frac{1}{3}$ yds. answer.

(10) An Ell Eng. $=\frac{5}{4}$yd. Then, as $\frac{3}{4}$yd. : $\frac{20}{1}$yd. : : $\frac{5}{4}$yd.
inverted.
: $\frac{240}{20}=12$ yds. For $\frac{3}{4}\times\frac{20}{1}\times\frac{4}{5}=\frac{240}{20}=12$ yds. answer.

(11) $5\frac{8}{9}$C. $=\frac{53}{9}$ of $\frac{4}{1}$ of $\frac{28}{1}=\frac{5936}{4}$lb. $6\frac{3}{4}$*d.* $=\frac{27}{4}$*d.* and $8\frac{5}{8}$*s.* $=$ $\frac{69}{8}$ of $\frac{12}{1}=\frac{828}{8}$*d.* Then, as $\frac{27}{4}$: $\frac{5936}{9}$: : $\frac{828}{8}$: $43\frac{1}{69}$
inverted.
lb. For $\frac{27}{4}\times\frac{5936}{9}\times\frac{8}{828}=\frac{1282176}{29808}=43\frac{1}{69}$lb. answer.

(12) $12\frac{1}{2}$*s.* $=\frac{25}{2}$*s.* $240\frac{1}{7}$ pieces $=\frac{1681}{7}$, and $20\frac{1}{8}$*s.* $=\frac{161}{8}$*s.*
Then, as $\frac{25}{2}$*s.* : $\frac{1681}{7}$ pes. : : $\frac{161}{8}$*s.* : $\frac{336200}{2254}$ pieces.
inverted.
For $\frac{25}{2}\times\frac{1681}{7}\times\frac{8}{161}=\frac{336200}{2254}=149\frac{177}{1127}$ pieces answer.

(13) $100\frac{2}{3}$*l.* $=\frac{302}{3}$*l.*; $6\frac{2}{3}$mo. $=\frac{20}{3}$ mo. and $3\frac{5}{6}=\frac{23}{6}$ of $\frac{12}{1}=$ $\frac{276}{6}=\frac{46}{1}$mo. Then, as $\frac{20}{3}$mo. : $\frac{302}{3}$*L.* : : $\frac{46}{1}$mo. : $\frac{6040}{414}$
inverted.
$=14\frac{244}{414}$*L.* For $\frac{20}{3}\times\frac{302}{3}\times\frac{1}{46}=\frac{6040}{414}$*L.* $=14$*l* 11*s* 9*d.* 1qr. $\frac{55}{69}$ answer.

(14) $5\frac{7}{12}=\frac{67}{12}$*s.* $26\frac{5}{8}=\frac{213}{8}$yds. and $8\frac{1}{2}=\frac{17}{2}$*s.* Then, as $\frac{67}{12}$*s.* : $\frac{213}{8}$yds. : : $\frac{17}{2}$*s.* $=\frac{28542}{1632}$yds. For $\frac{67}{12}\times\frac{213}{8}\times$
inverted.
$\frac{2}{17}=\frac{28542}{1632}=17$yds. 2qrs. 3na. $\frac{14}{17}$. answer.

THE DOUBLE RULE OF THREE IN VULGAR FRACTIONS.

EXAMPLES.

(2) Stated stud. 9 > $10\frac{7}{9}l.$ < 20 students > $39\frac{1338}{1458}L.$
thus; days 18   9   30 days

$$\begin{array}{ccc} 162 & \frac{97}{9} & 600 \end{array}$$

For $600\times 97\div 162\times 9=39\frac{1338}{1458}L.=39l\ 18s\ 4\frac{20}{81}d.$ answer.

(3) Thus; m 3 > $8\frac{9}{10}l.$ < 20 mon. > $305\frac{16}{468}L.$
d. $19\frac{1}{2}$ $100\frac{1}{4}$ days

$19\frac{1}{2}$days$\times$3m.$=\frac{117}{2}$; $8\frac{8}{10}l.=\frac{89}{10}l.$ and $100\frac{1}{4}$days$\times$20m.$=\frac{8020}{4}$. Then, inverted, $\frac{2}{117}\times\frac{89}{10}\times\frac{8020}{4}=\frac{1427560}{4680}L.=305l\ 0s\ 8\frac{8}{39}d.$ answer.

(4) Thus; P. 5 > $7\frac{4}{5}$G. < 8 Pers. > $280\frac{20}{25}$ gal.
w. 1 $22\frac{1}{2}$ w.

$7\frac{4}{5}$gal.$=\frac{39}{5}$gal. and $22\frac{1}{2}$w.$\times$8per.$=$180 third term.
1st. term inver.

Then, $\frac{180}{1}\times\frac{39}{5}\times\frac{1}{5}=\frac{7020}{25}=280\frac{4}{5}$ 3gal. answer.

(5) Thus, 14 pers. > weeks < 46pers. > $3\frac{56}{1173}$ weeks.
Inversely; $40\frac{4}{5}L.$ 20 $20\frac{3}{7}L.$

$40\frac{4}{5}=\frac{204}{5}\times 46=\frac{9384}{5}$ and $20\frac{3}{7}=\frac{143}{7}\times 14=\frac{2002}{8}$. Then $\frac{5}{9384}\times\frac{20}{1}\times\frac{2002}{7}=\frac{200200}{65688}=3\frac{56}{1173}$ weeks answer.

(6) First, $13\frac{1}{3}=\frac{40}{3}L.$ and $1\frac{1}{12}=\frac{13}{12}L.$ interest.

Thus; as $\left\{\begin{array}{l}\frac{40}{3}L.\\ \frac{3}{4}\text{yr.}\end{array}\right.$ > $\frac{13}{12}L.$ < $\begin{array}{l}\frac{50}{1}L.\\ \frac{5}{12}\text{yr.}\end{array}$ > $2\frac{37}{144}L.$

Secondly, $\frac{40}{3}\times\frac{3}{4}=\frac{120}{12}=\frac{10}{1}$ and $\frac{50}{1}\times\frac{5}{12}=\frac{250}{12}$. Then, as inverted $\frac{10}{1}:\frac{13}{12}::\frac{250}{12}:\frac{3250}{1440}L.$ For $\frac{1}{10}\times\frac{13}{92}=\frac{250}{12}\times\frac{3250}{1440}=2\frac{37}{144}L.$ or $2l\ 5s\ 1d.$ 2qr.$\frac{2}{3}$ the Interest.

To find the rate per cent. $\frac{50}{1}\times\frac{5}{12}=\frac{250}{12}$ and $\frac{100}{1}\times\frac{12}{12}=\frac{1200}{12}$. Then, as $\frac{250}{12}:\frac{3250}{1440}L.::\frac{1200}{12}:10\frac{5}{6}L.$ For $\frac{12}{250}\times\frac{3250}{1440}\times\frac{1200}{12}=10\frac{5}{6}L.$ answer.

(7) $2l\ 5s\ 1d.$ 2qr.$\frac{2}{3}=\frac{3250}{1440}L.$ $13\frac{1}{3}=\frac{40}{3}L.$ and $1\frac{1}{12}=\frac{13}{12}L.$

Thus by 2 statings.

1st. inversely, as $\frac{50}{1}:\frac{5}{12}::\frac{40}{3}:\frac{750}{480}$year. For $\frac{50}{1}\times\frac{5}{12}\times\frac{3}{40}=\frac{750}{480}$; 2nd. as $\frac{3250}{1440}:\frac{750}{480}::\frac{13}{12}:\frac{14040000}{18720000}$ year. For $\frac{1440}{3250}\times\frac{750}{480}\times\frac{13}{12}=\frac{14040000}{18720000}=\frac{3}{4}$ year the time.

Now to find the Rate. $\frac{40}{3}\times\frac{3}{4}=\frac{120}{12}=\frac{10}{1}$ and $\frac{100}{1}\times\frac{12}{12}=\frac{1200}{12}=\frac{100}{1}$ Then, as $\frac{10}{1}:\frac{13}{12}::\frac{100}{1}:\frac{1300}{120}L.$ For $\frac{1}{10}\times\frac{13}{12}\times\frac{100}{1}=\frac{1300}{120}=10\frac{5}{8}L.$ answer.

4)m. lb. 4 m. lb.
(8) Thus; as 12 : $1\frac{1}{8}$ :: 8 : $\frac{3}{4}$
— 2 —
3 — 2
3)$2\frac{2}{3}$
—
$0\frac{18}{24}=\frac{3}{4}$lb.
mo. lb. mo.
Then, as 1 : $\frac{3}{4}$ :: 6 : $4\frac{1}{2}$lb.
6
—
18÷4=$4\frac{1}{2}$lb. answer.
—

(9) $56\frac{1}{4}=\frac{225}{4}L.$ and $5\frac{1}{3}=\frac{16}{3}$ year.
Then, as $\frac{3}{4}$yr. : $\frac{225}{4}L.$ :: $\frac{16}{3}$yr. $\frac{11400}{36}L.=400L.$ for 2 Sons. For $\frac{4}{3}\times\frac{225}{4}\times\frac{16}{3}=\frac{11400}{36}=400L.$ and 400× 3÷2=600*L*. answer.

DECIMAL FRACTIONS.

ADDITION.

EXAMPLES.

(2) *L.* 857,7383

(3)
450,
31,47
376,004
1,08
456,
,76
,05
answer 1315,364

(4)
2476,8471
94,9
9,8941
867,05
84,9
271,007
5,1008
1,6789
answer 3811,3779

SUBTRACTION OF DECIMALS.

EXAMPLES.

1636,368 Gallons. 14894,399 Miles. 808,5581 Acres.

841,46
109,62
34,691

(1) From 100,17
Take 84,476

answer 15,694

From 985,771

478,462
37,66
378,8

Take 894,922

answer 90,849

MULTIPLICATION OF DECIMALS.

EXAMPLES.

(2) mul. 79,347
by 23,15

396735
79347
238041
158694

Facit 1836,88305

(4) mul. 3,141592
by 52,7438

25132736
9424776
12566368
21991144
6283184
15707960

Facit 165,6995001296

(3) mul. ,63478
by ,8264

253912
380868
126956
507824

Facit ,524582192

(5) mul. ,385746
by ,00463

1157238
2314476
1542984

Facit ,00178600398

(6) Mul. .002534
.03256
15204
12670
5068
7602
Facit 00008250704

(7) Thus; 245.378 263
5834.27
171764784
4907565
981513
73614
19630
1227
Facit 17774.6333

(8) Thus; 674.4378
863.72
134888
47210
2023
405
54
Facit 18458,0

(9) Thus; 27.1498600
53014.29
2443487400
54299720
10859944
271499
8145
1357
Facit 2508,928065

(10) Thus; 184.82 07
394 75.31
184 82 07
55 44 62
9 24 10
1 29 38
7 39
1 66
6
Facit 2508.928

DIVISION OF DECIMALS.

EXAMPLES.

(2) 23,15)1836,88305(79,347 Facit.
1620 5
216 38
208 35
8 033
6 945
1 0880
9260
16205
16205

(3) 158,694)3673,7661(23,15 fac.
3173 88
499 886
476 082
23 8041
15 8694
793470
793470

(4) 64,25)234,70525(3,653 Facit.
192 75
41955
38550
34052
32125
19275
19275

(5) ,9)9,0
Facit 10

(6) 9),9
Facit ,1

(7) 3),3
Facit ,1

(8) ,00463),00178600398(,385746 Facit.
1389
3970
3704
2660
2315
3453
3241
2129
1852
2778
2778

```
(9)   92,41035)2508,928065051(27,1498 Facit
               18482070
                6607210
                6468725
                 138485
                  92410
                  46075
                  36964
                   9111
                   8317
                    794
                    739
                     55

(10)   771492),00357200796(,00463 Facit.
               3085968
                4860399
                4628952
                 2314476
                 2314476

(11)   9,3654070)87,0763260(9,2976552
                 842886630
                  27876630
                  18730814
                   9145816
                   8428866
                    716950
                    655578
                     61372
                     56192
                      5180
                      4683
                       497
                       468
                        29
                        19
                        10
```

O

```
(12)  18,730814)174,152652(9,297 Facit.
                16 8577
                -------
                  5575
                  3746
                  ----
                  1829
                  1686
                  ----
                   143
                   131
                   ---
                    12
```

REDUCTION OF DECIMALS.

CASE 1.

EXAMPLES.

```
(2)  1/2)1,0        (3)  3/4)3,00
     -------             --------
Facit   ,5          Facit  ,75
     -------             --------
```

```
(4)  5/26)5,0000(,1923+facit.
          26
          ---
          240
          234
          ---
           60
           52
           --
            80
            78
            --
             2
```

```
(5)  26/57)26,00000(,45614+Facit.
           228
           ---
            320
            285
            ---
             350
             342
             ---
              80 &c.
              ------
```

```
      (6)  11/14 of 10/13=110/182
Then, 182)110,0000000(,6043956+Facit.
          109 2
          -----
            0 800
              728
              ---
               720
               546
               ----
               1740 &c.
```

(7) 4)$\frac{12}{16}$=$\frac{3}{4}$ of $\frac{5}{13}$ of $\frac{7}{26}$=$\frac{105}{1352}$
Then, 1352)105,00000(,07766+Facit.
9464
10360
9464
8960
8112
8480
8112
368

(8) $\frac{3}{8}$)3,000
Facit ,375

(9) $\frac{1}{25}$)1,00
Facit ,04

(10) $\frac{11}{20}$)11,00
Facit ,55

$\frac{57}{60}$)57,00
Fac. ,95

$\frac{36}{96}$=$\frac{3}{8}$)3,000
Facit ,375

$\frac{7}{8}$)7,000
Fac. 875

$\frac{14}{256}$=14,0000000÷256=,0546875. Facit.

CASE 2.

(2) 12|6,0 *d.*
20|7,500*s.*
Facit ,375*L.*

(3) 12|9,00*d.*
20| ,7500*s.*
Facit ,0375*L.*

(4) 4| 1,00 qrs.
12| 9,2500000*d.*
20|10,7708333*s.*
Facit ,5385416*L.*

(5) 1lb.×12×20×24=5760 grains in 1lb.
Then 24,00000000÷5760=,0041666+ Facit.

(6) 16oz.×16dr.=256dr.=1lb.
dr.
Then, 256)14,00000(,0546875 Fac.
12 80
1200
1024
1760 &c.

(7) a Ton=20 C. 4 C. 2 qr.
4 4
qrs. 80)18,000
Facit ,225 T.

(8) Fur. P. yds.
A mile=8×40×5$\frac{1}{2}$yds=1760yds.
Then, 76,000000yds.÷1760=
,04318+Facit.

(9) qrs. qrs. na.
A yard = 4 3 2
4 | 4
na. 16 | 14,000(,875 yd.
128
12 &c.

(10) perches.
An acre = 160)4,0000(,025 acre.
3 20
800
800

(11) 1 gal. = 8pts.)1,000
Facit ,125 gal.

(12) 1day = 24hr. × 60min. = 1440min.
Then, 7,00000min. ÷ 1440 = ,00480 + day. Facit.

(13) 28 | 14,0lbs.
4 | 2,500qrs.
Facit 3,625C.wt.

(14) 4 | 3,00na.
4 | 2,7500qrs.
Facit 7,6875yds.

(15) 40 | 14,00 poles.
4 | 1,3500 R.
Facit 13,3375 acres.

(16) 7 | 5,000000 days.
4 | 1,714285 + weeks.
Facit 3,428571 + months.

CASE 3.

(2) ,76*L.*
20
s. 15,20
12
d. 2,40
4
qr. 1,60

(3) ,625*s.*
12
d. 7,500
4
qrs. 2,000

(4) ,8322916*L.*
20
s. 16,6458320
12
d. 7,7499840
4
qrs. 2,9999360

(5) ,861 Cwt.
4
qrs. 3,444
28
lbs. 12,432
16
oz. 6,912
16
dr. 14,592

(6) ,7 lb. Troy
12
oz. 8,4
20
dwt. 8,0

(7) ,761 day.
24
hrs. 18,264
60
min. 15,840
60
sec. 50,400

(8) 4oz.=$\frac{1}{3}$),71 of 4oz Troy.
,236666+lb.
12+7
oz. 2,839999
20
dwt. 16,799980
24
grs. 19,1999520

(9) ,67 of a League.
3
m. 2,01
8
fur. 08
40
P. 3,20
5½
100
+10
qr. 1,10
3
ft. ,30
12
in. 3,60
3
b.c. 1,80

(10) ,4712 of an E. Eng.
5
qrs. 2,3560
4
na. 1,4240

(11) 3A. 2R. 4|2,0R.
3,5 acre.
×,092
70
315
,3220 acre.
4
R. 1,2880×40
P. 11,5200

(12) A year=365,25 days.
,3
days 109,575
24
2300
1150
hr. 13,800
60
min. 48,000

(13) ,6875yds.×4=2,7500qrs.×4=3,00 na. answer.

(14) ,3375 Acre.
4
R. 1,3500
40
P. 14,0000

(15) Thus ; ,785*L.*
s. 15 8½
For 7+7+1=15*s.* 0*d.*
and 35—1=34qrs.= 8½
answer *s.* 15 8½

(16) Thus ; ,875 of a *L.*
17 6
For 8+8+1=17*s.*
and 25—1=24qr.=6*d.*
answer *s.* 17 6

(17) mul. 12,4
by 9
answer *L.* 111,6=111*l* 12

(18) 25yds. at 2,75
25
1375
550
L. 68,75
20
s. 15,00

(19) ,48 of a lb.
20
9,60
+,16 of a *s.*
s. 9,76
12
d. 9,12

(20) ,17 of a lb, troy
12
2,04
+ ,84 of an oz.
oz. 2,88
20
dwt. 17,60
24
gr. 14,40

(21) ,17 of a T.
20
3,40
+,19C.wt.
C.wt. 3,59
4
2,36
+,17 qrs.
qrs. 2,53
28
14,84
+ ,7 of a lb.
lb. 15,54

(22) ,78 Acre.
4
3,12
+ ,67R.
R. 3,79
40
P. 31,60

(23) ,17 of a *L.*
20
3,40
—,7 of a *s.*
s. 2,70
12
d. 8,40
4
qr. 1,60

(24) ,41 of a day.
24
164
82
9,84
—, 16 of an hr.
hr. 9,68

then, hr. 9, 68
60
min. 40,80
60
sec. 48,00

THE SINGLE RULE OF THREE IN DECIMALS. DIRECT PROPORTION.

EXAMPLES.

(3) Thus; as 1,6C. : 3*l* 12,76*s.* : : 11C. 3qr. 10,12lbs.× 3, Or, as 179,2lbs. : 3,638*L.* : : 3978,36lbs. : 80,76 6036*L.* For 3978,36×3,638÷179,2=80*L* 15*s* 3*d.* 3, 36qrs. answer.

(3) Thus; as 1,5oz. : 7,8*s*. : : 9,7lb. Or, as 1,5oz. : 7,8*s*. : : 116,4 oz. : 605,28*s*. For 116,4×7,8=907,92 which ÷1,5=30*l* 5*s* 3*d*. 1,44qr. answer.

(4) Thus; as 1,47C. : 4,5*l*. : : 1,7lb. Or, as 164,64lbs. : 1080*d*. : : 1,7lb. : 11,1+*d*. For 1080×1,7=1836,0 which÷164,64=11,1+*d*. answer.

(5) Thus; as 1pt. : 1,2*s*. : : 12,5hhds. Or, as 1pt. : 1,2*s*. : : 6300pts. : 378*l*. For 6300×1,2=7560*s*, which÷20=378*l*. answer.

(6) Thus; as 1yd. : 12,3*s*. : : 21,5yds.×3 Or, as 1yd. : 12,3 : : 64,5 : 793,35*s*. For 64,5×12,3=793,35*s*. which ÷20=39*l* 13*s* 4,2*d*. answer.

(7) Thus; as 8,4lb. : 16*s* 4,6*d*. : : 4C. 2qr. 7,4lb.×3. Or, as 8,4lb. : 196,6*d*. : : 1534,2lbs. : 35907,466*d*.+For 1534,2×196,6÷8,4=149*l* 12*s* 3½*d*. nearly. answer.

(8) Thus; as 4*s* 2,6*d*. : 1yd. : : 6*l* 13,12*s*. Or, as 50,6*d*. : 1yd. : : 1597,44*d*. : 31,569yds. For 1597,44÷50,6 =31,569+yds. answer.

(9) 5,8T.×4×63=1461,6gal. and 60,4*l*.×20×12=14496*d*. Then, as 1461,6gal.—50,9gal. : 14496 : : 1gal. : 10,27*d*. +For 14496÷1410,7=10,27 pence. answer.

(10) 7,6C.×4qr.×28lb.=851,2lbs Then, as 1lb. : 4,5*d*. : : 851,2lbs. : 3830,4*d*. For 851,2×4,5=3330,4*d*.= 319,2*s*. sold for. And, as 1C. : 40,1*s*. : : 7,6C. : 304,76*s*. bought for. Then, 319,2*s*.—304,76*s*.=14,44*s*.=14*s* 5*d*. 1,12qr. answer.

(11) 3C. 1,5qr.=378lb. Then, as 1lb. : 2,75*s*. : : 378lb. : 51*l* 19*s* 6*d*. And 60*l* 11*s* 6*d*.—51*l* 19*s* 6*d*.=8*l* 12*s*. gain answer.

(12) From 10,75*s*.—8,5*s*.=2,25*s*. Then, as 1yd. : 2,25*s*. : : 436yds : 981*s*. or 49*l* 1*s*. answer.

(13) Thus; as 1*l*. : 7,5*s*. : : 296,85*l*. : 2226,375*s*.=111*l* 6*s* 4*d*½*d*. answer.

(14) First 7*s* 9½*d*.=93,5*d*. and 25*l* 18*s* 1¾*d*.=6217,75*d*. Then, as 93,5*d*. : 4qrs. : 6217,75*d*. : 266qrs. which÷5=53E.E. 1qr. answer.

(15) Thus; as 1yd. : 4,5ct. : : 345yds. : 1552,5cents, or 15D. 52ct. 5m. answer.

(16) Thus; as, 12825m : 675yds. : : 38m. : 2yds. ans.

(17) Thus; as, 19yds. : 25,75D. : : 435,5yd. : 590,217D.+ For 435,5×25,75÷19=590D. 2d. 1ct. 7$\frac{2}{19}$m. ans.

(18) 7⅜yds.=7,375yds. and 5½ dol.=5,5dols. Then, as 1yd. : 5,5 dols. :: 7,375 yds. : 40,5625 dols.=40 dols. 56¼ct. answer.

(19) Thus; as 7,375yds. : 40,5625dol. :: 1yd. : 5,5dol. For 40,5625÷7,375=5,5dols. answer.

(20) Thus; as 1,068ft. : 1 ft. :: 6ft. : 5,618ft.

$$\begin{array}{rl}
 & 6 \\
\cline{2-2}
1{,}068) & 6{,}0000000(5{,}618\text{ft. nearly. ans.} \\
 & 5340 \\
\cline{2-2}
 & \;\;6600 \\
 & \;\;6408 \\
\cline{2-2}
 & \;\;\;\;1920 \\
 & \;\;\;\;1068 \\
\cline{2-2}
 & \;\;\;\;\;\;8520 \\
 & \;\;\;\;\;\;8544
\end{array}$$

INVERSE PROPORTION.

EXAMPLES.

(2) Thus; as 6*l.* : 1,1333oz. :: 1,8125 : 3,75 oz. nearly. For 1,1333×6=6,7998 which÷1,8125=3oz. 12dr. ans.

(3) Thus; as 1ft. : 12ft. :: ,75ft. : 16ft. For 12,00÷,75 =16 feet. answer.

(4) Thus; as 1,25 yd. : 25,5 yds. :: ,75 yds. : 42,5 yds. For 25,5×1,25÷,75=42,5yds. answer.

(5) Thus; as 1E. : 4,5*s.* :: 25,6E. : 115,2*s* value of B's Holland. Then 115,2÷40,7=2,8304*s.*=2*s* 9*d.* 3,8qrs. per yd. answer.

(6) 34,5×100=3450*s.* As 7,5*s.* : 1D. :: 3450*s.* : 460D. For 3450÷7,5=460 dollars. answer.

(7) Thus; as 15mo. : 450*l.* :: 7,5mo. : 900*l.* For 450×15÷7,5=900*l.* answer.

THE DOUBLE RULE OF THREE IN DECIMALS.

EXAMPLES.

(2) Thus; as $\left.\begin{array}{r}\text{2men}\\\text{1day}\end{array}\right\}$: 4,625*s.* :: $\left\{\begin{array}{r}\text{4 men}\\\text{10,5 days}\end{array}\right\}$: 97,125*s.*
For 4,625×4×10,5÷2=4*l* 17*s* 1½*d.* answer.

(3) Thus; as $\left\{\begin{array}{l}\text{5,25C.}\\\text{20 m.}\end{array}\right\}$: 16,333 :: $\left\{\begin{array}{r}\text{17,75C.}\\\text{7,5 m.}\end{array}\right\}$: 20,7082*s.*
For 16,333×17,75×7,5÷5,25×20=1*l* 0*s* 8½*d.* answer.

(4) $\frac{1}{8}$)417,6 men. acres. men.

Thus; as 52,2 : 5 : : 417,6 : 40. Then.

2d. Inversely, as 6days : 40men : : 12days : 20men. ans.

By a Double stating, the months being inverted.

$$\text{Thus; as} \left\{\begin{matrix}15{,}25L.\\ 12{,}75\text{mo.}\end{matrix}\right\} : 76{,}94 :: \left\{\begin{matrix}6\ L.\\ 9{,}5\text{mo.}\end{matrix}\right\} : 22{,}55521L.$$

For 76,94×6×9,5÷15,25×12,75=22*l* 11*s* 1¼*d*. answer.

(6) Thus; by contraction,

$$\text{As} \left\{\begin{matrix}1=12\text{oxen}\\ 1=20\text{days}\end{matrix}\right\} : \begin{matrix}16{,}25\ \text{acres}\\ \underline{10}\end{matrix} :: \left\{\begin{matrix}24\text{oxen}=2\\ 100\text{days}=5\end{matrix}\right\} : 162{,}5\ \text{ans}$$

Acres 162,50 answer. 10

(7) Thus; the time inverted,

$$\text{As} \left\{\begin{matrix}3{,}5\ L.\\ 1{,}25\text{qr.}\end{matrix}\right\} \begin{matrix}L.\\ 100\end{matrix} :: \left\{\begin{matrix}38{,}5L.\\ \\ 1.\ \text{yr.}\end{matrix}\right\} :: \begin{matrix}L.\\ 880\end{matrix}$$

For 38,5×100÷1,25×3,5=880*L.* answer.

(8) By inverse proportion.

$$\text{Thus; as} \left\{\begin{matrix}6\ \text{men}\\ 12{,}3\ \text{hr.}\end{matrix}\right\} : 2{,}5\text{da.} :: \left\{\begin{matrix}9\ \text{men}\\ 8{,}2\ \text{hr.}\end{matrix}\right\} : 2{,}5\ \text{days.}$$

For 9×8,2×2,5÷6×12,5=2,5 days. Again 22,5×17,3×10,25=3989,8125 feet. And 34,6×45,×12,3=19151,1 feet. Then, as 3989,8125 ft. : 2,5days : : 19151,1 ft. : 12 days. For 19151,1×2,5÷3989,8125=12 days. answer.

THE SQUARE ROOT.

EXAMPLES.

```
(3)    , , , ,                        (4)  , , , ,
       5499025(2345 root.                  74770609(8647 root.
       4                                   64
       ----                                ----
   43)149                              166)1077
      129                                   996
      ----                                 -----
  464)2090                            1724) 8106
       1856                                 6896
      -----                                -----
 4685) 23425                         17287) 121009
       23425                                121009
```

```
        ,  , , ,
(5)    368863,00(607,34092+root.
       36
       ----
 1207)  8863
        8449
        ----
   12143) 41400
by contrac. 36429
   division  -----
      1214) 4971
      , , ,  4858
             ----
              113
              109
              ---
                4
                2
                -
                2
```

```
          , , , ,
(6)    3271,4007(57,19+root.
       25
       ---
 107)  771
       749
       ----
 1141) 2240
       1141
       ----
11429)109907
      102861
      ------
        7046
        ----
```

```
      ,  , , , ,
(7)   2,27109570(1,50701+root.
      1
      --
  25)127
     125
     -----
 3007) 21095
       21049
       -----
301401) 0467000
         301401
         ------
         165599
         ------
```

```
            ,  , , ,
(8)      10,000000(3,162277+root.
          9
          --
      61)100
          61
          ---
     626) 3900
          3756
          ----
    6322) 14400
          12644
          -----
    632,2) 1756
           1264
           ----
            492
            442
            ---
             50
             44
             --
              6
```

(9) 0003272481(,01809 root.
1
28)227
224
3609) 32481
32481

(10) 160,000000(12,649+root.
1
22)60
44
246)1600
1476
2524) 12400
10096
25289) 230400
227601
2799

(11) Thus; *s.* 30 *d.* 1
12
361(19 ans.
1
29)261
261

(12) Thus; 1,5×1,5=2,25
And 3,5×3,5=12,25
Then, inversely, as 2,25in. : 300min. : : 12,25in. : 55min. 6sec.
300
675,00÷12,25=55min. 6sec. ans.

(13)
484=22 root.
4
42) 84
84

(14) 17×17=289 }
20×20=400 } +
689(26,2+
4
46) 289
276
522) 1300
1044
256

(15) 36×36= 1296
24×24= −576
720(26,83+
4
46)320
276
528) 4400
4224
5363) 17600
16089
1511

```
(16)  60×60=3600ft. long.     Again          3600ft. long.
    37×37=—1369ft. high.        23×23=—529ft high.
           ————                        ————
           , ,                          , ,
           2231(47,23+ft.               3071(55,41ft.
           16                           25
         87) 631                   105) 571
             609                        525
        942) 2200                 1104) 4600
             1884                       4416
       9443) 31600               11081) 18400
             28329                      11081
              3271                       7319

         Then, 47,23 }
               55,41 } +
        answer 102,64 ft. broad.
```

(17) Com. mea. 761)$\frac{3044}{6849}=\frac{4}{9}$ whose root is $\frac{2}{3}$. answer.

(18) Com. mea. 144)$\frac{7056}{9216}=\frac{49}{64}$ whose root is $\frac{7}{8}$. answer.

```
(19) 3168/6192)3168,0000000     The right quotient.
           30960                  , ,  ,  ,  ,  ,
           —————                  5116279069(,71528+Facit.
            7200                  49
            6192                  ———
           ——————             141) 216
           10080                   141
            6192                   ————
           —————             1425) 7527
           38880                   7125
           37152                   —————
           —————            14302) 40290
           17280                   28604
           12384                   ——————
           —————           143048) 1168669
            48960                  1144384
            43344                  ———————
            —————                    24285
             56160
             55728
             —————
              43200
              37152
              —————
               6048
```

(20) $37\frac{36}{49}=\frac{1849}{49}$ whose root is $\frac{43}{7}=6\frac{1}{7}$ Facit.
(21) $17\frac{16}{25}=\frac{441}{25}$ whose root is $\frac{21}{5}=4\frac{1}{5}$ Facit.
(22) $76\frac{14}{17}$ Thus; 17)14,00000000

```
                  ,  ,  , ,  ,
             76,82352941+(8,7649+answer
             64
         167)1282
             1169
       1746) 11335
              10476
       17524) 85929
              70096
      175289) 1583341
              1577601
                 5740
```

THE CUBE ROOT.

EXAMPLES.

```
(2)                                            ,  ,  ,
                                           34328125(325 root
                                           27
{ Defect. div. & square of 2=2704)  7328
{ +180=comp. divisor          2884)  5768

{ Defect. div. & squ. of 5=307225)  1560125
{ +4800= com. divisor        312025)  1560125
```

```
                   ,  ,  ,
         Or thus; 34328125(325 Cube root.
                  27
First divisor=2790) 7328            3×3×300=2700
     2700×2     =   5400               3×30 =   90
      90×2×2=        360
       2×2×2=          8            1st. divisor=2790
                    5768
```

d. Divisor=308160)1560125 32×32×300=307200
307200×5 = 1536000 32×30 = 960
960×5×5= 24000
5×5×5= 125 2nd. Divisor=308160
1560125

(3)

846045 19(439
64
ct divisor & squar of 3= 4809)20604
)=complete divisor 5169)15507

t. divisor & squa. of 9 =554781) 5097519
10=complete divisor 566391) 5097519

(4)

259694072(638
216
fect. divisor & square of 3 =10809) 43694
=complete divisor 11349) 34047

Defect. divisor & square of 8 =1190764) 9647072
+15120=complete divisor 1205884) 9647072

(5)

22069810125(2805
8
Defect. divisor & squ. of 8=1264)14069
+480=complete divisor 1744)13952
Defective divisor =2352 117810
Defect. divis. & squa. of 5=23520025)117810125
+42000=complete divisor 23562025)117810125

(6)

673373097125(8765
512
Defect. divisor & squ. of 7=19249)161373
+1680=complete divisor 20929)146503
Defect. divi. & squ. of 6=2270736) 14870097
+15660=comp. divisor 2286396) 13718376
Defec. div. & squ. of 5=230212825)1151721125
+131400=com. divisor 230344225)1151721125

(7) 12,977875(2,35
8
Defect. divisor & square of 3=1209)4977
+180=complete divisor 1389)4167

Defect. divisor & sqr. of 5=158725)810875
+345=complete divisor 162175)810875

(8) ,001906624(124
1
Defect. divisor & squ. of 2 = 304) 906
+60=complete divisor 364) 728

Defect. divis. & squ. of 4=43216) 178624
+1440=complete divisor 44656) 178624

(9) 15926,972504(25,16+
8
Defect. divisor & squ. of 5=1225)7926
+300=complete divisor 1525)7625
Defec. divi. & squ. of 1=187501) 301972
+750=complete divisor 188251) 188251
Defec. divi. & squ. of 6=18900336)113721504
+45180=complete divi. 18945516)113673096
,48408

(10) 171,467764060(5,555+
125
Defect divi. & squ. of 5=7525)46467
+750=complete divisor 8275)41375
Defec. divi. & squ. of 5=907525)5092764
+8250=comp. divisor 915775)4578875
Defec. divi. & sq. of 5=92417525)513889060
+83250=com. divisor 92500775)462503875
51385186

(11) 12×12×12÷2=864 inches in half a solid foot.
6×6×6=216—do. in half a foot solid.
Then 648÷216=3 half feet answer.

(12) 12×12×12=3720 / 6×6×6=216 =8 cubes of 6 inches.
Cube inches in 1 foot=1728 / 3×3×3 27 =64 cubes of 3 inches. answ.

(13)

1953,125(12,5
1
304) 953
+60 364) 728
43225) 225125
+1800 45025) 225125

(14)

474552(78 root.
343
Defect. divi. & squ. of 8=14764)131552
+1680=complete divi. 16444)131552

Then 78×78=6084 answer.

(15)

L. *s.*
691 4
20

13824(24 pieces. answer.
8
Defec. divi. & squ. of 4=1216)5824
+240=comp. divisor 1456)5824

(16) Common measure=44($\frac{352}{1188}$=$\frac{8}{27}$ whose root is $\frac{2}{3}$ ans.
(17) Com. measure=24)$\frac{648}{3000}$=$\frac{27}{125}$ whose root is $\frac{3}{5}$ answer.
(18) Thus; $\frac{4}{9}$)4,000000000

,444444444+(,763+Fac.
343
Defec. div. & squ. of 6=14736)101444
+1260=comp. divisor 15996) 95976

Defec. div. & squ. of 3=1732809)5468444
+6840=comp. divisor 1739649)5218947
249497

(19) 7)6,000000000
,857142857(,949+
729
{ Defec. divisor & square of 4=24316)128142
{ +1080=complete divisor 25396)101584
{ Defec. divisor & squ. of 9=2650881)26558857
{ +25380=comp. divisor 2676261)24086349
2472508

(20) 13$\frac{2}{3}$. Thus ; 3)2,000000000000
13,666666666666(2,3908+
8
{ Defec. divi. & squ. of 3=1209)5666
{ +180=comp. divisor 1389)4167
{ Def. div. & sq. of 9=158781)1499666
{ +6210=comp. divi. 164991)1484919
Defec. divisor = 171363) 14747666
Def. div. & sq. of 8=1713630064)14747666666
+575100=co. div. 1714205164)13713641312
1034025354

(21) 42$\frac{21}{24}$=42$\frac{7}{8}$=$\frac{343}{8}$ whose root is $\frac{7}{2}$=3$\frac{1}{2}$ answer.
(22) 5$\frac{104}{125}$=$\frac{720}{125}$ whose root is $\frac{9}{5}$=1$\frac{4}{5}$ answer.
(23) 405$\frac{28}{125}$=$\frac{50653}{125}$ whose root is $\frac{37}{5}$=7$\frac{2}{5}$ answer.
(24) 7$\frac{3}{5}$)3,0
7,600000000(1,996+ans.
1
{ Defec. divisor & squ. of 9=381)6600
{ +270=complete divisor 651)5859
{ Defec. divi. & sq. of 6=108336)741000
{ +3420=com. divisor 111756)670536
{ Defec. div. & sq. of 6=11524836)70464000
{ +35280=com. divi. 11560116)69360696
1103304

(25) $9\frac{1}{6}$) 1,000000000

, , , ,

9,166666666(2,092+ans.

8

Defec. divisor 12)1166

Defec. divi. & sq. of 9=120081)1166666

+5400=comp. divi. 125481)1129329

Defec. divi. & sq. of 2=13104304)37337666

+12540=comp. divi. 13116844)26233688

11093978

ARITHMETICAL PROGRESSION.

CASE 1.

EXAMPLES.

(2) 16—1=15

4

60

+ 5

5+65=70

16=num. of terms.

2)1120

12) 560 *d.*

2,0) 4,6 8

The last term *d.* 65=5*s.* 5*d.* answer *L.* 2 6 8=sum rec'd

(3) 1+100=101 sum of extremes.

50=$\frac{1}{2}$ number of terms.

2,0)505,0*s.*

answer *L.* 252 10

(4) 2+2=4 the first term,

and 100×4=400 the last term,

4+400=404 sum of the extremes.

× 50=$\frac{1}{2}$ num. of terms.

yds. in a mile=176,0)2020,0(11 miles.

176

260

176

yds. in a furl.=22,0) 84,0 yds.

answer 11m. 3fur. 180yds.

(5) 54—1=53
× 3 com. dif.
159
+ 2=1st term.
last term 161*s.*=8*l.* 1*s.*
+ 2
163 sum of extre.

then, 163 sum of extremes.
54÷2= 27=½no. of terms.
1141
326
2,0)440,1
answer *L.* 220 1 whole sum.

(6) 14—1=13
×2
26
+6
L. 31 for the last yr.

then, *L.* 31 for the last year.
+5
36
14÷2= 7
L. 252 for 14 years.

Then 252÷14=18*l.* annually. ans.

CASE 2.

EXAMPLES.

(2) 48—3=45 last term, less the first; and $45\div\overline{10-1}=5$ common difference. answer.

(3) 60—20=40 and $40\div\overline{21-1}=2$ com. diff. answer. Then 20=the age of the first; and 20+2=22 ditto of the second &c. &c.

(4) 60—6=54 and $54\div\overline{19-1}=3$ miles common difference.
Then, 60+6=66
× 19
1254÷2=627 miles, answer.

GEOMETRICAL PROGRESSION.

EXAMPLES.

(2)
1 2 3 4 5
2, 4, 8, 16, 32
×32
64
96
1024=10th power of the ratio.

continued.

1024=10th power of the ratio.
× 1024
1048576=20th ditto.
× 1024
1073741823=30th ditto, leſs by 1
× 2 equal 1st. term.
12)2147483646 *d.*
2,0)178956970 6
3,0)894784,8 10 6=amount.
answer *L.* 298261 12 4=per bushel.
(3) 1 2 3 4 5
2, 4, 8, 16, 32
× 32
1024=10th power of ratio.
× 32
2,0)3276,7=15th ditto less 1
answer *L.* 1638 7*s.*
(4) 1 2 3
4, 16, 64=3d. power of the ratio.
× 64
4096=6th ditto.
× 4096
4—1=3)16777215=12th ditto, 1 deducted.
4) 5592405 qrs.
12)1398101¼
2,0) 11650,8 5¼
L. 5825 8 5¼ sold for
12×4=—48 0 0 bought for
answer *L.* 5777 8 5¼ gained.
(5) 1 2 3 4 4+4= 8
2, 4, 8, 16,=4th pow. of ra.; & 16×16=256=8th do.
8 + 8
256×256 = 65536=16th do.
×65536
4)4294967295=32d. 1 subt.
12)1073741823¾
2,0)8947848,5 3¾
answer *L.* 4473924 5 3¾

```
5)              1  2  3  4   5
                3, 9, 27, 81, 243=5th power of the ratio.
                 5 + 5  =  10
           and 243×243 = 59049=10th ditto.
                       × 59049
          3—1=2)3486784400 =20th do. 1 deducted.
                1743392200
                       ×     4 =first term.
arl. cor. in a pt.=768,0)697356880,0
     pints in a bushel=64) 908016 } rejecting,
               2s 6d.=⅛)  14187 } remainders.
                answer L. 1773  7  6

      1 2 3  4  5         5 + 5 = 10
)     3, 9, 27, 81, 243 and 243×243=59049=10th power of ratio.
          10 +  10 =   20
 Then, 59049×59049=3486784401=20th ditto.
                   ×        59049
            1,00)2058911320946,48=30th do. 1 deduct.
                4)2058911320946 qrs.
               12)514727830236½
               2,0)428939858,5,3 0½
                  L. 2144699292 13 0½ amount.
         50L.×30yds.=    1500  0 0 deduct.
          answer L. 2144697792 13 0½ gained.

3)        1   2   3     3+3 =  6
          2,  4,  8 and 8×8 = 64=6th power of the ratio.
                            × 64
                            4095=12th do. 1 subtracted.
                            × 21=shillings in a guinea.
                            4095
                           8190
                     2,0)8599,5 shillings.
                answer L. 4299 15
```

SIMPLE INTEREST BY DECIMALS.

EXAMPLES.

L. *s.* Princi. time. rati. interest *L.* *s.* *d.*

(2) 917 16=917,8×7×,05=321,23=321 4 7,2 answer.

L. *s.* Princi. ratio. commission *L.* *s.* *d.*

(3) 391 17=391,85 which×,045=17,63325=17 12 7,98

(4) 567*l.* 10*s.*=567,5 Principal.

9×,06= ,54 Time and ratio.

L. *s.*

L. 306,450=306 9= Interest.

+ 567 10= Prin. } answer.

L. 873 19= amount.

(5) 4726*l* 18*s* 6½*d.*=4726,92708*L.* Princi.

3,5×,07= ,245 time and ratio.

L. *s.* *d.*

Product=*L.* 1158,09713560=1158 1 11,3=Inter.

(6) 9526*l.* 12*s.* 9*d.*=9526,6375=Principal.

12,75 × ,07 = ,8925 time and ratio.

Product=*L.* 8502,52397875=Interest.

+ 9526,6375 =Principal.

answer *L.* 18029,16147875=Amt.=18029*l.* 3*s.* 2

ALLIGATION.

CASE 1.

EXAMPLES.

C.wt. *s.* *s.*

(2) Thus; 2 at 56=112 } By the rule of three direct.

1 at 43= 43 } +

2 at 50=100 }

Then, as 5 : 255 :: 3C.wt. : 7*l.* 13*s.* answe

(3) Thus; 4 oz. at 5*s* =20*s.*

8 oz. at 4*s* =32*s.*

Then, as 12 : 52 :: 1 oz. : 4*s.* 4*d.* answer

Gal. s. d. d.
(4) Thus; 12 at 4 10 = 696
24 at 5 6 =1584
16 at 6 3½=1204
gal. d. s. d.
Then; as 52 : 3484 : : 1 : 67=5 7 answer.

oz. Car. Car.
(5) Thus; 8 of 22 176
1lb. 8 oz.=20 of 21 420
10 of 18 180
oz. Car.
Then, as 38 : 776 : : 1 : $20\frac{8}{19}$ answer.

lb. oz. oz.
(6) Thus; 5 of 8=40
10 of 7=70
15 of 6=90
lb. oz. dwt. gr.
Then, as 30 : 200 : : 1 : 6 3 8 answer.

CASE 2.

EXAMPLES.

(2)	24	2+6=8	qts. of Canay,	answ.
Mean rate 18	16	6	Sherry.	
	12	6	Malaga.	

(3) 1st.	12	2 at 12	2d.	12	1+2=3 at 12
M. R	11	1 at 11	M. R	11	2 at 11
10	9	1 at 9	10	9	2 at 9
	8	2 at 8		8	1+2=3 at 8
		lb. s.			lb. s.
3rd.	12	1 at 12	4th.	12	1 at 12
M.R.	11	2 at 11	M.R.	11	1+2=3 at 11
10	9	2 at 9	10	9	1+2=3 at 9
	8	1 at 8		8	1 at 8
		lb. s.			lbs.
5th.	12	2 = 2 at 12	6th.	12	2add1=3
M.R.	11	1 add 2=3 at 11	M.R.	11	1add2=3
10	9	1 = 1 at 9	10	9	1add2=3
	8	2 add 1=3 at 8		8	2add1=3

3 lbs. of each, answer.

CASE 3.

EXAMPLES.

(2) 30 4 | Againsı
M.R. 36 4 | given qu
22 48 4 |
18 26+14+8=48 | Theref
As 48bu : 4bu. : : 12bu. : 1bu. of each

(3) 16 2
M.R. 20 2
22 24 2+4+22+6=34
18 2 Against the given quant
0 2 sequently the quantity f
be 10 oz.

Then, as 2 oz. : 34 oz. : : 10 oz. : 17

(4) 48 16 | Against the price of the give n
M.R. 36 4 |
28 24 8 | Then, as 16 : 4 / 8 / 20 : :
12 20 |

48 4 | Against the price of the
M.R. 36 16 |
28 24 20 | Then, as 4 : 16 / : 20 / : 8 : : 10
12 8 |

48 4+16=20 | Against the
M.R. 36 16 | : 16

$$\text{M.R. } 28\left\{\begin{array}{l}48\\36\\24\\12\end{array}\right.\quad\begin{array}{r|}16+4=20\\4\\20+8=28\\20\end{array}\ \begin{array}{l}\text{Against the price, \&c.}\quad\text{bu.}\\ \text{As } 20\left\{\begin{array}{l}:\ 4\\:\ 28\\:\ 20\end{array}\right\}::\ 10\left\{\begin{array}{l}:\ 2\\:\ 14\\:\ 10\end{array}\right\}\end{array}\ \text{6th ans.}$$

$$\text{M.R. } 28.\left\{\begin{array}{l}48\\36\\24\\12\end{array}\right.\quad\begin{array}{r|}4\\4+16=20\\8+20=28\\8\end{array}\ \begin{array}{l}\text{Against the price, \&c.}\quad\text{bu.}\\ \text{As } 4\left\{\begin{array}{l}:\ 20\\:\ 28\\:\ 8\end{array}\right\}::\ 10\left\{\begin{array}{l}:\ 50\\:\ 70\\:\ 27\end{array}\right\}\end{array}\ \text{7th ans.}$$

CASE 4.

EXAMPLES.

$$\text{(2) M.R. } 6\left\{\begin{array}{l}4\\5\\8\end{array}\right.\quad\begin{array}{r|}2\\2\\2+1=3\end{array}\ \text{Then, as }\overset{\text{lb.}}{7}:\overset{\text{lb.}}{21}::\left\{\begin{array}{l}\overset{\text{lb.}}{2}:\overset{\text{lb.}}{6}\text{ at }\overset{s.}{4}\\2:6\text{ at }5\\3:9\text{ at }8\end{array}\right\}\ \text{1st. ans.}$$

Sum of the difference=7

$$\text{M.R. } 7\left\{\begin{array}{l}4\\5\\8\end{array}\right.\quad\begin{array}{r|}1\\1\\3+2=5\end{array}\ \text{Then, As }\overset{\text{lb.}}{7}:\overset{\text{lb.}}{35}::\left\{\begin{array}{l}\overset{\text{lb.}}{1}:\overset{\text{lb.}}{5}\text{ at }\overset{s.}{4}\\1:5\text{ at }5\\5:25\text{ at }8\end{array}\right\}\ \text{2d. ans.}$$

Sum of the differ.=7

$$\text{(3) M.R } 16\left\{\begin{array}{l}8\\12\\18\\22\end{array}\right.\quad\begin{array}{r|}6\\2\\4\\8\end{array}\ \text{As }\overset{\text{lb.}}{20}:\overset{\text{lb.}}{120}::\left\{\begin{array}{l}6:36\\2:12\\4:24\\8:48\end{array}\right\}\text{answer.}$$

Sum. of diff.=20

$$\text{(4) M.R. } 33\left\{\begin{array}{l}48\\0\end{array}\right.\quad\left.\begin{array}{r}33\\15\\\hline 48\end{array}\right\}\ \text{Then, as }\overset{\text{gal.}}{48}:\overset{\text{gal.}}{80}::\left\{\begin{array}{l}\overset{\text{gal.}}{33}:\overset{\text{gal.}}{55}\\15:25\end{array}\right\}\text{ans.}$$

$$\text{(5) M.R. } 18\left|\begin{array}{l}15\\17\\20\\22\end{array}\right.\quad\begin{array}{r}4\\2\\1\\3\\\hline 10\end{array}\ \text{Then, as }\overset{\text{Car.}}{10}:\overset{\text{Car.}}{40}::\left|\begin{array}{l}4:16\text{ at }15\\2:8\text{ at }17\\1:4\text{ at }20\\3:12\text{ at }22\end{array}\right|\text{ans.}$$

SINGLE POSITION.

EXAMPLES.

(2) Suppose A's age 20
Then B's 30
and C's 60
Sum 110

As 110 : 132 : : $\begin{cases} 20 : 24 \text{ A's age} \\ 30 : 36 \text{ B's} \\ 60 : 72 \text{ C's} \end{cases}$
Proof 132

(3) Suppose 100 ÷ $\begin{cases} \frac{1}{4} = 25 \\ \frac{1}{5} = 20 \\ \frac{1}{6} = 16\frac{2}{3} \end{cases}$
$61\frac{2}{3}$

Then, as $61\frac{2}{3}$: 74 : : 100 : 120 answer.

(4) Suppose 250*l.* whose interest for 10 yrs. = 150*l.* and 150*l.* + 250*l.* = 400*l.* Therefore, as 4,00*l.* : 5,00*l.* : : 250*l.* : 312*l.* 10*s.* answer.

(5) Suppose 20 min.
of an hour 20 min. = $\frac{1}{3}$ 54)162 com. denominator.
of 2 hours 20 = $\frac{1}{6}$ 27
of 3 hours 20 = $\frac{1}{9}$ 18
$\frac{99}{162} = \frac{11}{18}$

Then as 11 parts : 20 min. : : 18 parts : 32 min. $43\frac{7}{11}$ sec. ans.

(6) Suppose 90*l.*
Thus; 90 $\begin{cases} \div \frac{1}{3} = 30 \\ \div \quad = 22\frac{1}{2} \\ \div \frac{1}{6} = 15 \end{cases}$
$67\frac{1}{2}$

From 90
Take $67\frac{1}{2}$
$22\frac{1}{2}$

Then, as $22\frac{1}{2}$*l.* : 28*l.* : : 90*l.* : 112*l.* answer.

(7) Suppose 45 and 45×3÷5 = 27 which ×7 = 189
45×2÷3 = 30+
219

Then, as 219 : 292 : : 45 : 60 years. answer.

(8) Suppose 100
$\frac{1}{3}$ | $33\frac{1}{3}$
$\frac{1}{4}$ | 25
$\frac{1}{5}$ | 20
Sum $78\frac{1}{3}$

Then, as $78\frac{1}{3}$: 100 : : 94 : 120 answer.

(9) Suppose 600, whose interest for 12 yrs. = 432 and 600 + 432 = 1032. Then, as 1032 : 600 : : 860 : 500*l.* answer.

(10) Suppose 80
$\frac{1}{3}$ | $26\frac{2}{3}$
$\frac{1}{4}$ | 20
$\frac{1}{5}$ | 16
$\frac{1}{6}$ | $13\frac{1}{3}$
Sum 76

Then, as 76 : 80 : : 57 : 60 answer.

(11) Suppose 100 scholars.
2
$\frac{1}{2}$ | 200 Sch. Sch. Sch. Sch.
$\frac{1}{3}$ | 50 Then, as $308\frac{1}{3}$: 333 :: 100 : 108
$\frac{1}{4}$ | $33\frac{1}{3}$ 3 300 3
25
$308\frac{1}{3}$ 925 300
99900÷925=108 ans.

(12) Suppose 90*l.* Then 90÷$\frac{1}{3}$=30 & 90—30=60*l.* A lays out: and 60×2=120 B lays out; then 120-90=30 which should be 50. Therefore, as 30*l.* : 50 :: 90*l.* : 150*l.* answer.

(13) Suppose 120,00*l.* $\frac{1}{20}$)1200,0
6
1600
720,00
—600 Then, as 120*l.* : 100 :: 12000*l.* : 10000*l.* answer.
L. 120

DOUBLE POSITION.

EXAMPLES.

(2) 1st. Sup. A had 15*l.* 2d. Sup. A had 25*l.*
Then, 15×2—8=22B. then, 25×2—8=42B.
and 15×3—15=30C. and 25×3—15=60C.
(Excess.
100—67=33 defect. 127-100=27
15×27=405
25×33=825
Sum 6,0)123,0
L. *s.* 20 10*s.* A's part
20 10×2— 8=33 0 B's do.
20 10×3—15=46 10 C's do.
Proof *L.* 100

(3) 1st. sup. A paid 12 2d. Sup. A paid 16
Then 12+10=22 B. Then 16+10=26
and 12+22=34 C. and 16+26=42
100—68=32 defect. 100-84=16 def.

continued.

Then, 16×32=512 A paid =20*l*.
12×16=192 B 20+10=30 answer.
C 20+30=50
Differ. 16) 320
A paid *L*. 20 Proof *L*. 100

(4) 1st. sup. C's age 70. 2d. sup. C's age 90
Then, 70÷2+20=55 B's then 90÷2+20—65 B's
and 20 A's and 20 A's
75 —85
75—70=5 defect. — (exc.
90—85=5 Er. of
Therefore 70×5=350 From C's=80
90×5=450
80÷2+20=60 B's
Sum 1,0) 80,0 add 20 A's
answer C's age =80 yrs. Take B & A's =80
remains 0 the Proof.

(5) 1st. Sup. the body 30 inches. 2d. Sup 40 inches.
Then, 30÷2+9=24 tail. 40—2+9=29
9 head. 9
33—30=3 def. 40—38=2 excess
Therefore, 30×2= 60 36in.=body.
40×3=120 36÷2+9=27=tail.
9 =head.
Sum 5) 180
Whole length 72 in.=6ft, ans.
Leng. of the body=36 inches.

(6) 1st Suppose he worked 20 days.
Then 20 at 20*d*. =400*d*.
and 20 idle at 10*d*.=200—
2*l*. 1*s*. 8*d*.=500*d*.—200=300 Defect,
Therefore 25×300=7500
20×150=3000
Difference 15,0) 450,0
answer, he worked 30 days.
2nd. Suppose 25 days at work.
Then 25 at 20*d*.=500
and 15 idle at 10*d*.=150—
500–350=150 defect.

continued.

For 30days at 20d.=600d.
10days at 10d.=100—
Proof. 500d.=2l. 1s. 8d.

(7) 1st. Suppose 4 of Damask. 2nd. Suppose 6 of Damask.
Then 4 at 8s.=32s. Then 6 at 8s.=48
and 11 at 3s.=33 and 9 at 3s.=27
3l. 10s.=70s.-65=5 defect. 75-70s=5 exc.
Therefore, 4×5=20 For 5yds. at 8s.=40
6×5=30 and 10 at 3s.=30
Sum 10)50 Proof. 70s=3l 10s.

answer 5 yds. of damask and 10 lining.

(8) Sup. 1st. ¼)400l. and 400 2d. Sup. 500l. and 500
+100 —225 —225 ¼=125
500 175 275 625
—350 × 2 × 2 —550
Defect. 150 350 550defec.=75
Then, 500×150=75000
400× 75=30000
75)45000(600l. answer.

(9) 1st. Suppose the man 42, ⅓ of which is 14 for the wife.
14+15×2=58 2d. Sup. 48 +15=63
42+15= —57 of which ⅓=16 & 16+15×2=62
Error of excess 1 Error of defect. 1
Then, 42 1 42. 45+15=60 his age when 15yrs. married.
48 1 48 15+15=30 his wife's do. do.
2)90 30=difference.

The husband 45 yrs. old. } As 8yr. : 16yr. : : 30yr. : 60yr.
and the wife 15, answer. } Proof.

PERMUTATION.

EXAMPLES.

(2) 1×2×3×4×5×6×7×8×9×10×11×12=
479001600 Changes.
×3

6,0)143700480,0 sec.

6,0)2395008,0

6)399168 hrs.

quar. of da.=66528 dividend.

$365\frac{1}{4}$ days=1461qrs. Divis.
1461)66528(45yrs. 195da. 18hr. answer.
5844

8088
7305

4)783

days. hrs.
$195\frac{3}{4}$ da.=195 18

(3) 1×2×3×4×5×6×7×8=40320 changes, or days.
Then 40320×4=161280
$= 110\frac{570}{1461}$ yrs.=110yrs. 142 days.
365×4+1=1461 answer.

(4) 1×2×3×4×5×6×7×8×9×10×11×12×13=
6227020800, which ×14×15×16×17×18×19×20
21×22×23×24×25×26=403291461126605635584000000 answer.

COMBINATION.

EXAMPLES.

(2)
$$\frac{\overset{2}{\cancel{24}}\times 23\times \overset{2}{\cancel{22}}\times \overset{7}{\cancel{21}}\times \overset{\cancel{2}}{\cancel{20}}\times 19\times \overset{\cancel{2}}{\cancel{18}}\times 17\times \overset{\cancel{2}}{\cancel{16}}\times \overset{\cancel{3}}{\cancel{15}}\times \overset{\cancel{2}}{\cancel{14}}\times 13}{1\times \cancel{2}\times \cancel{3}\times \cancel{4}\times \cancel{5}\times \cancel{6}\times \cancel{7}\times \cancel{8}\times \cancel{9}\times \cancel{10}\times \cancel{11}\times \cancel{12}}=$$

2704156 pence.=11267*l.* 6*s.* 4*d.* answer.

(3)
$$\frac{\overset{\cancel{2}}{\cancel{100}}\times \overset{\overset{11}{\cancel{33}}}{\cancel{99}}\times \overset{\cancel{2}}{\cancel{98}}\times 97\times \overset{\cancel{2}}{\cancel{96}}\times \overset{\cancel{19}}{\cancel{95}}\times \overset{2}{\cancel{94}}\times 93\times \overset{2}{\cancel{92}}\times 91\times \overset{\cancel{2}}{\cancel{90}}}{1\times \cancel{2}\times 3\times \cancel{4}\times \cancel{5}\times \cancel{6}\times 7\times \cancel{8}\times \cancel{9}\times \cancel{10}\times \cancel{11}}$$

$$\frac{\times 89\times \overset{2}{\cancel{88}}\times 87\times \overset{2}{\cancel{86}}\times \overset{17}{\cancel{85}}\times \overset{2}{\cancel{84}}\times 83\times \overset{\cancel{2}}{\cancel{82}}\times \overset{9}{\cancel{81}}\times \overset{\overset{\cancel{5}}{\cancel{2}}}{\cancel{80}}\times 79}{\times 12\times \cancel{13}\times \cancel{14}\times \underset{\cancel{5}}{\cancel{15}}\times \cancel{16}\times \cancel{17}\times \cancel{18}\times \cancel{19}\times \underset{\cancel{5}}{\cancel{20}}\times \cancel{21}}$$

continued,

$$\frac{\times\overset{\cancel{2}}{\cancel{78}}\times\overset{\cancel{11}}{\cancel{77}}\times\overset{\cancel{2}}{\cancel{76}}\times\overset{\cancel{3}}{\cancel{75}}\times\overset{\cancel{2}}{\cancel{74}}\times\overset{.}{73}\times\overset{\cancel{2}}{\cancel{72}}\times\overset{.}{71}\times\overset{\cancel{2}}{\cancel{70}}\times\overset{\cancel{3}}{\cancel{69}}}{\times\underset{\cancel{11}}{\cancel{22}}\times\cancel{23}\times\cancel{24}\times\cancel{25}\times\cancel{26}\times\cancel{27}\times\cancel{28}\times\cancel{29}\times\cancel{30}\times\cancel{31}}$$

$$\frac{\times\overset{\cancel{2}}{\cancel{68}}\times\overset{.}{67}\times\overset{\cancel{2}}{\cancel{66}}\times\overset{\cancel{13}}{\cancel{65}}\times\overset{\cancel{2}}{\cancel{64}}\times\overset{\cancel{3}}{\cancel{63}}\times\overset{\cancel{2}}{\cancel{62}}\times\overset{.}{61}\times\overset{\cancel{2}}{\cancel{60}}\times\overset{.}{59}}{\times\cancel{32}\times\cancel{33}\times\cancel{34}\times\cancel{35}\times\cancel{36}\times\cancel{37}\times\cancel{38}\times\cancel{39}\times\cancel{40}\times\cancel{41}}$$

$$\frac{\times\overset{\cancel{2}}{\cancel{58}}\times\overset{.}{57}\times\overset{\cancel{2}}{\cancel{56}}\times\overset{\cancel{11}}{\cancel{55}}\times\overset{\cancel{2}}{\cancel{54}}\times\overset{.}{53}\times\overset{\cancel{2}}{\cancel{52}}\times\overset{\cancel{3}}{\cancel{51}}}{\times\cancel{42}\times\cancel{43}\times\cancel{44}\times\cancel{45}\times\cancel{46}\times\cancel{47}\times\cancel{48}\times\cancel{49}\times\cancel{50}} =$$

DUODECIMALS.

ADDITION.

EXAMPLES.

Facit ·314ft. 3in 6″ 4‴ 9″″

(1)	Ft.	in.	″
	1295	9	8
	1295	9	8
	1295	9	8
	1295	9	8
	1295	9	8
answer	6479	0	4

(2)	Ft.	in.
	27	3
	25	11
	23	10
	20	9
	20	6
	18	5
	Ft. 136	8 in. answer.

SUBTRACTION.

EXAMPLES.

Ft.	in.	″	‴	″″	
2799	1	1	11	10	Facit.

(2)	Ft.	in.
From	41	7
Take	19	10
answer ft.	21	9

MULTIPLICATION.

CASE 1.

EXAMPLES.

		Ft.	in.	″		
(2)	Multiply	28	10	6		
	By		3	2	4	
		0	9	7	6	0
		4	9	9	0	
		86	7	6		
	answer feet=	92	2	10	6	0

CASE 2.

EXAMPLES.

ft. in. ft. in.
(2) Mul. 82 6 by 13 3
12+1=13ft.

990 0
In. 3=¼ 82 6
20 7 6″

answer 1093 1 6

ft. in.
(3) Mul. 79 8×2
By 6×6+2=38
478 0
6
2868 0
In 159 4
6=½ 39 10
4=⅓ 26 6 8″
1=¼ 6 7 8
Facit 3100 4 4 answer.

ft. in.
(4) Mul: 59 9
By 4×6=24
239 0
6in.=½ 6
1434 0
29 10 6
9)1463 10 6
yds. 162 5ft.+ans.

(5)

$$\frac{21,5\times17,5}{1,5\times\ 1,5}=\frac{376,25}{2,25}=167+\text{ans.}$$

PROMISCUOUS QUESTIONS.

(1) 47 21
—21 +60

answer 26 A's age, 81 B's.

(2) 25×2=50
5×2+20=30—

answer 20=the differ.

(3) Thus; 35 35
—30 +30

As 1day : 5 : : 7days : 35M. 65×7=45 5m. answer.

(4) Thus; As 2.5*L.* : 100*L.* : : 32.5*L.* : 900*L.* answer.

(5) A, B & C = 350*L.*
B, C & D = 345
C, D & A = 400
D, A & B = 378
Num. combined = 3)$\overline{1473}$
A, B, C & D = 491*L.* whole sum.

Then, 491−345 = 146 A's.
491−400 = 91 B's.
491−378 = 113 C's.
491−350 = 141 D's.
answer.
Proof. *L.* $\overline{491}$

(6) 10*s.* 6*d* = 10.5*s.* which ÷ 3 = 3.5*s* gain; and 10.5*s.*— 3.5*s* = 7*s.* first cost. Then say, as 7*s.* : 3.5*s.* : : 100*L.* : 50*L.* = gain per cent. and 12*s.*—7*s.* = 5*s.* as 3.5*s.* : 50*L.* : : 5*s.* : 71*L.* 8*s.* $6\frac{6}{7}$*d.* per cent. answer.

(7) $\frac{2}{3}$ of $\frac{3}{8} = \frac{6}{24} = \frac{1}{4}$. Therefore, as 1 part : 1260*l.* : : 4 parts : 5040*L.* answer.

(8) 275*L.*—250*L.* = 25*L.* gain.

As 250*l.* in 3 mo. > 25*L.* < 100*l.* 12mo. > 40*L.*

For $\overline{100\times12\times25}\div\overline{250\times3}$ = 40*L.* answer.

(9) 3500
—2500
L. $\overline{1000}$

As 25,00*L.* in 8 yrs. > 1000*l.* < 1,00*l.* 1yr. > 5*l.*

For 1000 ÷ $\overline{25\times8}$ = 5*l.* per cent. answer.

(10) mo. | 5*l.*
6 = $\frac{1}{2}$ | —
3 = $\frac{1}{2}$ | 2 10
1 5
$\overline{3\ 15}$
100 0
$\overline{103\ 15}$

As 103*l.* 15*s.* : 100*l.* : : 200*l.* : 192*l.* 15*s.* $5\frac{5}{83}$*d.* And 192*l.* 15*s.* $5\frac{6}{83}$*d.*— 150*l.* = 42*l.* 15*s.* $5\frac{5}{83}$*d.* answer.

(11) First, Suppose 4 o'clock; then 12—4 = 8 remains, and $\frac{4}{5}$ of $\frac{8}{1} = \frac{32}{5}$ = 6.4. Then 6.4—4 = 2.4 Error of defect:
2d. Suppose 5 o'clock; 12—5 = 7 remains, and $\frac{4}{5}$ of $\frac{7}{1} = \frac{28}{5}$ = 5.6; then 5.6—5 = .6 Error of defect. Therefore,
5×2.4 = 12.
4× .6 = 2.4.
differ. 1.8) 9.6)5.333+ = 5hr. 20min. time required. ans.

(12) First, 12—1 = 11 the difference of velocity between the hour and minute hands. Then say, as 11 : 1 : : 12× 4 : $4\frac{4}{11}$hr. or $21\frac{9}{11}$ min. past 4. answer.

	Gal.		*s.*	*d.*		*s.*
(13)	12	at	6	4	=	76
	18	at	4	10	=	87
	12	at	3	1	=	37
	Gals. 42	=	*168qts.*			*200s.*

Then, as 168qts. : 200*s.* : : 1qt. : $1\frac{4}{21}$*s.* and as 100*l.* : 110*l.* : : $1\frac{4}{21}$*s.* : 1*s.* $3\frac{5}{7}$*d.* per qt. answer.

(14) Thus, inversely, as 5yr. 5mo. : 210*l.* 3*s.* : : 3yr. 3mo.
Or, As 65mo. : 4203*s.* : : 39mo. : 7005*s.*=350*l.* 5*s.*
For 4203×65÷39=7005*s.*=350*l.* 5*s.* answer.

(15) Take 50*l.* and say, inversely, as 100*l.* : 5yr. : : 50*l.* : 10yr. In 10 years 50*l.* will gain 22*l.* 10*s*; but to find in what time 50*l.* will gain 50*l.* say, as 22*l.* 10*s.* : 10yr. : : 50*l.* : $24\frac{16}{31}$ yrs. answer.

(16) 350 Prin.×4÷100=14*l.*=interest for 1 year.
4×8=32*l.* 8
+ 100
112*l.*=ditto. for 8 yrs.
As 132 : 32*l.* : : 350 : 84*l.* $16\frac{32}{33}$*s.* rebate.
Then 112*l.*–84*l.* $16\frac{32}{33}$*s.*=27*l.* 3 $\frac{1}{33}$*s.* in favour of interest. ans.

(17) 100*l.*+20*l.*=120*l.* Then, as 50*s.* : 120*l.* : : 45*s.* : 108*l.* and 108*l.*—100*l.*=8*l.* per cent. gain. answer.

(18) First, 100–17=83*l.* and 100+20=120*l.* Then say, as 83*l.* : 63*l.* : : 120*l.* : 91*l.* 1*s.* $8\frac{20}{83}$*d.* And 91*l* 1*s.* $8\frac{20}{83}$*d.*—63*l.*=28*l.* 1*s.* $8\frac{20}{83}$*d.* answer.

(19) $\frac{1}{3}$ | 4*d.*
$\frac{1}{3}$ | $1\frac{1}{3}$ · · 2(6 com. divi.
| $0\frac{4}{6}$ 4
+1
answer 2 pence.

(20) 6×12×12=864=6 doz. doz.
6×12=–72=$\frac{1}{2}$ doz. doz.
answer 792 difference.

(21) First, Suppose 100. Then 100÷2=50&50+15=65
100÷3=$33\frac{1}{3}$+10=$43\frac{1}{3}$
and 100—65=35—
Error of defect $8\frac{1}{3}$

2nd. Suppose 120
Then 120—2=60+15=75
120÷3—10=50
120—75=45—
Error of defect 5

Therefore
120×$8\frac{1}{3}$=1000
100×5 = 500
difference $3\frac{1}{3}$) 500
3 3
thirds 1,0)150,0
answer 150 members.

(22) First, Suppose 8 Beggars, then 8×3—8=16, and 16÷8=2, and nothing over, so the defect is 3

2nd. Suppose 9 Beggars, then $\overline{9\times3}$—8=19 and 19÷9=2 and 1 over, which should be 3, so the defect is 2.

Therefore 9×3=27
8×2=16
1) 11(11 Beggars, answer.

For 11×3—8=25
and 25÷11=2*d.* each, and 3*d.* over. Proof.

(23) Answer $99\frac{9}{9}$. For $99\frac{9}{9}=\frac{900}{9}=100$

(24) Let the principal be 50*l* and 50×2=100*l.* Amount, and 100—50=50 Interest, then
50×.06=3.00)50
16.6666 yrs.=16 yrs. 8mo. answer.

(25) 8*s.* $11\frac{1}{4}$*d.*=429qrs.
——=39 Scholars, answer.
$2\frac{3}{4}$*d.*= 11

(26) $\frac{1}{2}$)360
$69\frac{1}{2}$
3240
2160
180
2,0 2502.0
$365\frac{1}{4}$ 1251
4 4
1461) 5004(3yrs. $155\frac{1}{4}$da. ans.
4383
4)621
$155\frac{1}{4}$ days.

(27) 5*L.*
100
L. *L.* *L.* *s.* *d.*
As 105 : 100 : : 74.9 : 71 6 8
100
105)7490.0(71 6 8 ans.

(28) 100×3 = 325
150×4 = 675
204×$5\frac{3}{4}$=1173
——mo. days.
454) 2173(4 $23\frac{26}{454}\frac{3}{4}$
1816
357, &c.

(29) Thus; As 16 parts : 1400*l.* : : 3 parts : $262\frac{1}{2}$*l.*
3
4200÷16=262*l.* 10*s.* answer.

(31) Stated thus; As $\frac{3}{4}$: $7\frac{3}{5}$ $\frac{38}{5}$ :: $\frac{8}{7}$: $6\frac{18}{35}$E.E.
For

$$\frac{3\times38\times8}{4\times\ 5\times7}=\frac{912}{140}=6\frac{18}{35}\text{ E:E.}$$

Then inversely, As 5 : $6\frac{18}{35}$ :: 4 : 8yds. 0qr. 2.$\frac{2}{7}$na. ans.

(32) $7\frac{1}{3}=\frac{22}{3}$ and $8\frac{4}{5}=\frac{44}{5}$ Then,
As { 22 : 1 work :: 3 : $\frac{3}{22}$ ·· 132 968 common denomina.
   { 44 : 1 :: 5 : $\frac{5}{44}$ ·· $\frac{110}{242}$
Therefore, as 242 parts : 1w. :: 968 parts : 4 hours. ans.

(33) $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{6}$ are $=\dfrac{6+3+2}{12\ \ 12\ \ 12}=\frac{11}{12}$
and $\frac{12}{12}-\frac{11}{12}=\frac{1}{12}=60+40=100$ trees. Then, as $\frac{1}{12}$: 100 trees :: $\frac{12}{12}$: 1200 trees. answer.

(34) $\frac{5}{8}$ of $\frac{2}{5}=\frac{10}{40}=\frac{1}{4}$ Therefore, as $\frac{1}{4}$: 375 :: $\frac{4}{4}$: 1500*l*. ans.

(35) $\frac{5}{7}$ of $\frac{3}{8}$ of $\frac{4}{5}=\frac{60}{280}=\frac{6}{28}$, and $\frac{2}{9}$ of $\frac{7}{8}$ of $\frac{12}{13}$ of $\frac{1000}{1}=\frac{7000}{39}$*l*.
Then as $\frac{6}{28}$: $\frac{7000}{39}$ :: $\frac{28}{28}$, or, $\dfrac{6\times7000\times28}{28\times\ 39\ \times28}=837L.$
12*s*. $1\frac{25}{39}$*d*. the cost of the ship. And 1000*L*.+837*L*. 12*s*. $1\frac{25}{39}$*d*.=1837*L*. 12*s*. $1\frac{25}{39}$*d*. answer.

(36) Thus; as 7 : 1560 :: 12

$$\begin{array}{r l}
 & 12 \\
\hline
 & 7)\,18720 \\
\hline
\frac{2}{8}=\frac{1}{4} & 2674\frac{2}{7} \\
 & 5\frac{3}{8} \\
\hline
 & 13371\frac{3}{7}\ \cdot\cdot\ 24(56\text{ common, denomina.} \\
\frac{1}{8}=\frac{1}{2} & 668\frac{16}{28}\ \cdot\cdot\ 32 \\
 & 334\frac{16}{56}\ \cdot\cdot\ 16 \\
\hline
 & \frac{1}{3})\,14374\frac{2}{7} \\
 & 4791\frac{3}{7} \\
\hline
 & L.\ 19165\frac{5}{7}=19165l.\ 14s.\ 3\frac{3}{7}d.\ \text{answer.}
\end{array}$$

(37) $\frac{16}{16}-\frac{5}{16}=\frac{11}{16}$ and $\frac{3}{4}$ of $\frac{5}{6}$ of $\frac{11}{16}=\frac{165}{384}=\frac{55}{128}$; Then the fractions are $\frac{11}{16}$ and $\frac{55}{128}$ which brought to a com. denom. are $\frac{1408}{2048}$ and $\frac{880}{2048}$, then $\frac{1408}{2048}-\frac{880}{2048}=\frac{528}{2048}=537L.$ Therefore, as 528 parts : 537*L*. :: 2048 parts : 2082*L*. 18*s*. $2\frac{2}{11}$*d*. answer.

(38) Thus; as 7da. : 1 work : : 1da. : $\frac{1}{7}$work, and as 12da. : 1work : : 1da. : $\frac{1}{12}$ work; Then $\frac{1}{7}=\frac{12}{84}$ and $\frac{1}{12}=\frac{7}{84}$, and $\frac{12}{84}+\frac{7}{84}=\frac{19}{84}$ Therefore, as 19parts : 1da. : : 84parts : $4\frac{8}{19}$ days, answer.

(46) $\frac{2}{5}=\frac{14}{35}$ and $\frac{3}{7}=\frac{15}{35}$. Then $\frac{14}{35}+\frac{15}{35}=\frac{29}{35}$, and $\frac{35}{35}-\frac{29}{35}=\frac{6}{35}$ =C's part:

$$\text{Now, as } \left\{ \text{6parts : 256}l. \right. : : \left\{ \begin{array}{l} \text{14 parts : } 597\tfrac{1}{3}L. \text{ A put in.} \\ \text{15 parts : 640 B put in.} \end{array} \right.$$

(47) 35×35=1225 square of the line,
27×27=-729 square of the river's breadth,

496(22.271yds,=22yds. $9\frac{3}{4}$+in. answer.
4
42)96
84
12, &c.

(50) In the ball's ascent it occupies 6 seconds or half the time. 12—6=6, then 6×4=24 and 24×24=576 feet. answer.

(51) 484(22÷4=$5\frac{1}{2}$ seconds, answer.
4
42)84
84

(52) 47×47×47=103823

(53) 12×12×12=1728

ft. in. ft. in. ″
(54) 5 7×1 10=10 2 10 at 1$=$10,23 answer.

(55) 30 6×15 3=45 9·52 8×45 9÷100= 24 sq. $9\frac{1}{2}$ ft. 24 $9\frac{1}{2}$×1,75= $42,16 answer.

(56) 931×55,4=515 dols. 77 cts. 4m. answer.

(57) 81,76÷1,12=73 bus. answer.

(58) 4,97,2×94=467 dol. 36,8 m. answer.

(59) 4,56×27=123,12 answer.

(60) 281×9=2,52,9 answer.

(67) 21,186×5,50÷1000=$116,52,3 answer.

(68) 18,00÷1000=1ct. 8m. answer.

$$\text{(69) Time 136 da.} \left\{\begin{matrix}\text{If 1 Ton.}\\ 30\end{matrix}\right\} \text{2 dol.} \left\{\begin{matrix}186s.\\ 136d.\end{matrix}\right.$$

186×136×2÷30=$1686,40 cts. answer.

(70) 2176,5×2½÷100=$54,40¼ answer.

(71) 1873,40 × 2½ ÷ 100 = 46,83,5
46,83,5

1826,56,5×¼÷100=4,56,6
4,56,6

$1821,99,9 answer.

(72) 1650×12÷100=198 dol. answer.

(73) 1250×7½÷100=93,75 answer.

(74) 4500×25÷100, or
25=¼)4500

$1125 answer.

(75) 1650×15½÷100=255, dol. 75 cts. answer.

45
43
+84
364